OCTOBER 1991

ACADEMIC MEDICINE

JOURNAL OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

Biomedical Research

Need for Unity in the Research Community

Ensuring Support for Biomedical Research

Observations of the AAMC Advisory Panel

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Structural Informatics for Medicine and Biology

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AAMC Papers: Graduates' Specialties and Careers

VOLUME 66 • NUMBER TEN

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COLLEGES

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

OCTOBER 1991
VOLUME 66
NUMBER TEN

ACADEMIC MEDICINE

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; $130/2 years; $185/3 years; and $8.00 per single copy.

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Subscription requests received after June 30th will be honored for the fiscal year (July through June). Subscribers who want back issues for January through June of that calendar year must purchase them as individual back issues at $7.00 each and as available in stock.

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AAMC PAPERS

The Specialty Choices and Early Career Development of 1987 and 1991 U.S. Medical School Graduates

AUGUST G. SWANSON, M.D., ROBERT A. HAYNES, Ph.D., CHARLES D. KILLIAN, M.A., and
MICHELLE KEYES-WELCH, M.H.S.A.

Academic Medicine

OCTOBER 1991

The Specialty Choices and Early Career Development of 1987 and 1991 U.S. Medical School Graduates

AUGUST G. SWANSON, M.D., ROBERT A HAYNES, Ph.D., CHARLES D. KILLIAN, M.A., and MICHELLE KEYES-WELCH, M.H.S.A.

The Association of American Medical College's (AAMC's) Student and Applicant Information Management System (SAIMS) provides data for a continuing longitudinal study of the specialty choices and career development of medical school graduates. This report tracks 1987 medical school graduates through four years of graduate medical education and shows their distribution among specialties by race-ethnicity and gender in the third and fourth years. It also gives such data for 1991 graduates.

(*Note:* Some titles in the following tables describe subspecialty training for which no certification is provided.)

1987 GRADUATES

There were 15,843 graduates of accredited U.S. medical schools in 1987. Of these, 15,364 (97%) entered a first-year postgraduate residency position. The distribution of these residents among various specialties and subspecialties through four postgraduate years can be readily determined from Table 1. For example, 5,187 residents were in first-year internal medicine positions, representing 32.7% of the total cohort. Of these, 3,689 continued into the second year and 3,461 into the third year. In the fourth year, 1,263 residents were distributed among the internal medicine subspecialties, and 795 residents continued in undifferentiated internal medicine positions. We assume that a vast majority of the 1,403 (40.5%) residents who did not continue into a fourth postgraduate year entered practice as generalists in internal medicine.

There were 1,910 graduates who entered first-year positions in family practice programs, representing 12.1% of the total cohort. Slightly over 95% of them continued into the third year, and only 220 (12.1%) of these continued into a fourth postgraduate year. We assume that a vast majority of the 1,600 residents (87.9%) who left after three years entered practice as family practitioners.

There were 1,523 graduates who entered first-year pediatrics positions, representing 9.6% of the cohort. By the third year the number decreased to 1,369; of these, 582 (42.5%) continued into a fourth year of pediatrics training, 347 (25.3%) in undifferentiated pediatrics positions, and 235 (17.2%) in pediatrics subspecialty programs. We assume that a vast majority of the 787 (57.4%) who did not continue into a fourth year position entered practice as generalist pediatricians.

From the data in this table, we estimate that 3,790 (23.9%) of the 15,843 1987 graduates entered primary care practices (family practice, general internal medicine, and general pediatrics) after three years of residency and are accounted for among the 4,998 who are known to be in practice or are missing.

The specialty choices and career development for the 1987 graduates who entered other specialties also can be analyzed from Table 1.

Tables 2 and 3 show the PGY-3 and PGY-4 activities of the 1987 graduates for each specialty by race-ethnicity and gender. Using the tables, the reader can determine the actual number of residents in any specialty by completing simple mathematical calculations. (See the boxed instruction for using tables 2, 3, and 4.) For example, the 1,820 PGY-3 residents in family practice consisted of 41 black women, 40 black men, 11 Mexican-American women, 37 Mexican-American men, 5 other Hispanic women, 11 other Hispanic men, 4 Native American women, 5 Native American men, 23 Asian women, 42 Asian men, 2 Mainland Puerto Rican women, 3 Mainland Puerto Rican men, 4 Commonwealth Puerto Rican women, 8 Commonwealth Puerto Rican men, 490 white women, and 1,080 white men; and data were missing for 14 men and women. Similar calculations can be obtained for other specialties using the formulas described below.

The reader can also determine whether a subpopulation is more or less represented in any specialty compared with its representation in the total cohort. For example, 37 Mexican-American men were in family practice residencies, which is over twice the expected value of 17 for the subpopulation of Mexican-American men. Similar analyses can be completed for other ethnic groups and specialties.

1991 GRADUATES

Table 4 presents the PGY-1 activities of 1991 U.S. medical school graduates by race-ethnicity and gender. This table is provided as additional information to previously published data on the results of the National Residency Matching Program, with supplemental information provided by U.S. medical school deans, and is comparable to data published for 1989 and 1990 U.S. medical school graduates.[1-3] There were 1,613 family practice residents, 3,025 residents in internal medicine, and 1,471 residents in pediatrics (10.41%, 19.53%, and 9.50% of the total U.S. medical school graduate PGY-1 population, respectively).

Dr. Swanson is vice-president for graduate medical education and international programs; Dr. Haynes is a research associate in the Section for Operational Studies; Mr. Killian is a senior research associate and director of the Student and Applicant Information Management System (SAIMS); and Ms. Keyes-Welch is a staff associate in the Office of Graduate Medical Education and International Programs; all are at the Association of American Medical Colleges, Washington, D.C.

Similar analysis, as described above, can be applied to the data shown in this table to determine the actual number of residents by race-ethnicity and gender for any specialty and the representation of any ethnic or gender group by specialty compared with its representation in the total cohort. This information will be useful in longitudinal studies in the specialty choices and career development of U.S. physicians.

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TABLE 1. PGY-1 through PGY-4 Activities of 1987 U.S. Medical School Graduates

	PGY-1		PGY-2		PGY-3		PGY-4	
	No.	%	No.	%	No.	%	No.	%
IN RESIDENCY PROGRAM								
Allergy & Immunology	—	—	—	—	1	0.	24	.2
—Diagnostic Laboratory Immunology	—	—	—	—	—	—	3	0
Anesthesiology	290	1.8	884	5.6	967	6.1	1,066	6.7
Anesthesiology—Critical Care	—	—	4	0	1	0	9	.1
Dermatology	8	1	135	.9	155	1.0	189	1.2
Dermatology—Dermatopathology	1	0	1	0	—	—	—	—
Emergency Medicine	269	1.7	363	2.3	377	2.4	217	1.4
Emergency Medicine & Internal Medicine	—	—	—	—	—	—	3	0
Emergency Medicine—Sports Medicine	—	—	—	—	—	—	1	0
Emergency Medicine—Pediatric	—	—	—	—	—	—	4	0
Family Practice	1,910	12.1	1,841	11.6	1,820	11.5	214	1.4
Family Practice—Geriatric Medicine	—	—	—	—	—	—	2	0
Family Practice—Sports Medicine	—	—	—	—	—	—	4	0
Internal Medicine	5,187	32.7	3,689	23.3	3,461	21.8	795	5.0
Internal Medicine—Preliminary	—	—	2	0	6	0	4	0
Internal Medicine—Primary Care	5	0	26	.2	27	.2	24	.2
Internal Medicine & Pediatrics	11	.1	69	.4	96	.6	110	.7
Internal Medicine & Physical Medicine and Rehab.	—	—	—	—	—	—	15	.1
Internal Medicine & Psychiatry	—	—	1	0	—	—	2	0
Internal Medicine—Adolescent Medicine	—	—	—	—	—	—	2	0
Internal Medicine—Allergy & Immunology	—	—	—	—	—	—	12	.1
Internal Medicine—Cardiac Electrophysiology	—	—	—	—	—	—	5	0
Internal Medicine—Cardiovascular Disease	—	—	1	0	14	.1	300	1.9
Internal Medicine—Clin. Investigator Pathway	—	—	—	—	—	—	1	0
Internal Medicine—Clinical Nutrition	—	—	1	0	—	—	4	0
Internal Medicine—Clinical Pharmacology	—	—	1	0	—	—	3	0
Internal Medicine—Critical Care	—	—	—	—	—	—	19	.1
Internal Medicine—Diagnostic Lab. Immunology	—	—	—	—	3	0	—	—
Internal Medicine—Endocrinology & Metab.	—	—	1	0	3	0	61	.4
Internal Medicine—Gastroenterology	—	—	—	—	2	0	201	1.3
Internal Medicine—Geriatrics	—	—	—	—	3	0	29	.2
Internal Medicine—Hematology	—	—	—	—	2	0	21	.1
Internal Medicine—Hematology and Oncology	—	—	1	0	7	0	67	.4
Internal Medicine—Infectious Disease	—	—	1	0	3	0	74	.5
Internal Medicine—Medical Oncology	—	—	1	0	3	0	32	.2
Internal Medicine—Nephrology	1	0	—	—	1	0	75	.5
Internal Medicine—Pulmonary Disease	1	0	1	0	3	0	141	.9
Internal Medicine—Rheumatology	—	—	1	0	4	0	56	.4
Internal Medicine—Sports Medicine	—	—	—	—	—	—	4	0
Internal Medicine—Transplant Medicine	—	—	—	—	—	—	1	0
Neurology	40	.3	199	1.3	226	1.4	250	1.6
Neurology—Child	—	—	—	—	6	0	11	.1

Continued

TABLE 1. PGY-1 through PGY-4 Activities of 1987 U.S. Medical School Graduates—*Continued*

	PGY-1		PGY-2		PGY-3		PGY-4	
	No.	%	No.	%	No.	%	No.	%
Nuclear Medicine	1	0	7	0	10	.1	10	.1
Obstetrics & Gynecology	919	5.8	885	5.6	884	5.6	888	5.6
Obst. & Gyn.—Gynecologic Oncology	—	—	—	—	2	0	7	0
Obst. & Gyn—Reproductive Endocrinology	—	—	—	—	—	—	3	0
Ophthalmology	26	.2	345	2.2	380	2.4	402	2.5
Otolaryngology	42	.3	132	.8	204	1.3	217	1.4
Otolaryngology—Head and Neck Surgery	—	—	—	—	—	—	6	0
Pathology	243	1.5	262	1.7	265	1.7	251	1.6
Pathology—Anatomic	4	0	3	0	4	0	6	0
Pathology—Anatomic and Clinical	12	.1	24	.2	25	.2	38	.2
Pathology—Clinical	4	0	1	0	3	0	5	0
Pathology—Dermatopathology	—	—	—	—	—	—	1	0
Pathology—Forensic	—	—	—	—	—	—	2	0
Pathology—Hematology	—	—	—	—	—	—	2	0
Pathology—Immunopathology	—	—	—	—	1	0	1	0
Pathology—Neuropathology	—	—	—	—	1	0	1	0
Pathology—Radioisotopic	—	—	—	—	—	—	5	0
Oral Surgery	2	0	11	.1	2	0	—	—
Pediatrics	1,523	9.6	1,442	9.1	1,369	8.6	347	2.2
Pediatrics—Primary	—	—	2	0	2	0	9	.1
Pediatrics, Psychiatry & Child Psychiatry	—	—	—	—	—	—	4	0
Pediatrics—Adolescent Medicine	—	—	—	—	—	—	10	.1
Pediatrics—Cardiology	—	—	—	—	2	0	40	.3
Pediatrics—Critical Care Medicine	—	—	1	0	2	0	16	.1
Pediatrics—Developmental Pediatrics	—	—	—	—	—	—	7	0
Pediatrics—Diagnostic Laboratory Immunology	—	—	—	—	—	—	3	0
Pediatrics—Emergency Medicine	—	—	—	—	—	—	13	.1
Pediatrics—Endocrinology	—	—	—	—	1	0	8	.1
Pediatrics—Gastroenterology	—	—	—	—	—	—	7	0
Pediatrics—Hematology and Oncology	1	0	—	—	3	0	30	.2
Pediatrics—Infectious Disease	—	—	—	—	—	—	13	.1
Pediatrics—Neonatal and Perinatal Medicine	—	—	—	—	2	0	54	.3
Pediatrics—Nephrology	—	—	—	—	—	—	10	.1
Pediatrics—Pulmonology	—	—	—	—	—	—	9	.1
Pediatrics—Rheumatology	—	—	—	—	—	—	2	0
Physical Medicine and Rehabilitation	78	.5	196	1.2	200	1.3	216	1.4
Preventive Medicine	2	0	7	0	8	.1	14	.1
Preventive Medicine—Aerospace	1	0	—	—	—	—	—	—
Preventive Medicine—Clinical	—	—	—	—	—	—	1	0
Preventive Medicine—Occupational Medicine	2	0	9	.1	11	.1	17	.1
Preventive Medicine—Public and General	—	—	—	—	1	0	1	0
Preventive Medicine—Public Health	—	—	4	0	3	0	4	0
Psychiatry	756	4.8	875	5.5	885	5.6	769	4.9
Psychiatry—Addiction Psychiatry	—	—	—	—	—	—	1	0
Psychiatry—Child and Adolescent	—	—	3	0	13	.1	114	.7
Radiology	—	—	114	.7	120	.8	127	.8
Radiology—Diagnostic	255	1.6	517	3.3	550	3.5	579	3.7
Radiology—Nuclear	—	—	4	0	5	0	1	0
Radiology—Oncology (Therapeutic)	11	.1	76	.5	97	.6	115	.7

Continued

TABLE 1. PGY-1 through PGY-4 Activities of 1987 U.S. Medical School Graduates—*Continued*

	PGY-1		PGY-2		PGY-3		PGY-4	
	No.	%	No.	%	No.	%	No.	%
Surgery	2,266	14.3	1,533	9.7	1,085	6.8	939	5.9
Surgery—Preliminary	—	—	7	0	4	0	8	.1
Surgery—Critical Care	—	—	—	—	—	—	1	0
Surgery—General Vascular	—	—	6	0	3	0	3	0
Surgery—of the Hand	—	—	—	—	—	—	1	0
Surgery—Pediatric	—	—	—	—	2	0	1	0
Surgery—Neurological	34	.2	101	.6	114	.7	116	.7
Surgery—Orthopedic	253	1.6	451	2.8	517	3.3	548	3.5
—Orthopedic—Hand Surgery	—	—	—	—	—	—	1	0
Surgery—Plastic	6	0	6	0	7	0	20	.1
Surgery—Thoracic	—	—	—	—	—	—	1	0
Urology	71	.4	75	.5	188	1.2	227	1.4
Transitional	1,129	7.1	81	.5	14	.1	4	0
NOT IN RESIDENCY PROGRAM								
Practice patient care	20	.1	492	3.1	604	3.8	3,743	23.6
Research	68	.4	46	.3	67	.4	79	.5
Not in GME but in medicine	6	0	21	.1	5	0	20	.1
Administrative or faculty position	—	—	1	0	8	.1	274	1.7
Year off	51	.3	71	.4	55	.3	42	.3
Missing	285	1.8	740	4.7	869	5.5	1,255	7.9
Non-medical activity	23	.1	16	.1	8	.1	13	.1
Dismissed or departed	24	.2	48	.3	30	.2	89	.6
Deceased	2	0	5	0	17	.1	17	.1
COLUMN TOTALS	15,843	100	15,843	100	15,843	100	15,843	100
IN PRIMARY CARE RESIDENCIES								
Family Practice	1,910	12.1	1,841	11.6	1,820	11.5	214	1.4
Internal Medicine	5,187	32.7	3,689	23.3	3,461	21.8	795	5.0
Internal Medicine—Primary Care	5	0	26	.2	27	.2	24	.2
Internal Medicine & Pediatrics	11	.1	69	.4	96	.6	110	.7
Pediatrics	1,523	9.6	1,442	9.1	1,369	8.6	347	2.2
Pediatrics—Primary	—	—	2	0	2	0	9	.1
PRIMARY CARE COLUMN TOTALS	8,636	54.5	7,069	44.6	6,775	42.8	1,513	9.5

INSTRUCTIONS FOR USING TABLES 2, 3, AND 4

The first two rows in each table give the column total number or percentage of the cohort. The first two columns in each table give the total number and percentage by specialty. For example, Table 2 shows 361 black women among the cohort, representing 2.28% of the total cohort. As another example, there were 967 residents in anesthesiology, representing 6.1% of the total cohort.

The remaining cells in the tables show row percentages that allow the reader to identify the proportion of individuals in any specialty program or activity by ethnicity and gender. For example, Table 2 shows that 2.03% of the individuals in family practice were Mexican-American men. To determine the approximate number of Mexican-American men in family practice, the cell must be multiplied by the total number of residents in family practice. Therefore, the total number of Mexican-American men in family practice residencies is approximately 37 (.0203 × 1820). To determine the percentage of Mexican-American men in family practice residencies, the reader must divide the number acquired above by 150, the total cohort of Mexican-American men. Thus, 24.7% of the Mexican-American men are in family practice residencies.

The reader can also determine the expected values for each subpopulation by specialty with one calculation. For example, the expected number of Mexican-American men in PGY-3 family practice residencies can be determined by multiplying the total number of family practice residents by the column total for Mexican-American men listed in the second row of the table. Thus, the expected value is approximately 17 (.95% × 1820).

TABLE 2. PGY-3 Activities of 1987 U.S. Medical

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)		→	*n* = 361	*n* = 453	*n* = 85	*n* = 163	*n* = 30	*n* = 32
Column Total (percentage)		→	2.28%	2.86%	.54%	.03%	.19%	.20%
	No.	%	%	%	%	%	%	%
IN RESIDENCY PROGRAM								
Allergy & Immunology	1	.01	—	—	—	—	—	—
Anesthesiology	967	6.10	1.97	3.83	.31	.52	.31	.21
Anesthesiology Critical Care	1	.01	—	—	—	—	—	—
Dermatology	155	.98	3.87	—	1.29	.65	—	—
Emergency Medicine	377	2.38	2.65	3.71	.27	1.59	—	.27
Family Practice	1,820	11.49	2.25	2.20	.28	.60	.22	.28
Internal Medicine	3,461	21.85	2.20	3.41	.67	1.19	.09	.20
Internal Medicine—Preliminary	6	.04	—	—	—	—	16.67	—
Internal Medicine—Primary Care	27	.17	—	—	—	—	—	—
Internal Medicine & Pediatrics	96	.61	2.08	6.25	2.08	1.04	—	—
Internal Medicine—Cardiovascular Disease	14	.09	7.14	—	—	—	—	—
Internal Medicine—Diag Lab Immunology	3	.02	—	—	—	—	—	—
Internal Medicine—Endocrinology & Metab.	3	.02	—	—	—	—	—	—
Internal Medicine—Gastroenterology	2	.01	—	—	—	—	—	—
Internal Medicine—Geriatrics	3	.02	—	—	—	—	—	—
Internal Medicine—Hematology	2	.01	—	—	—	—	—	—
Internal Medicine—Hematology & Oncology	7	.04	—	—	—	—	—	—
Internal Medicine—Infectious Disease	3	.02	—	—	—	—	—	—
Internal Medicine—Medical Oncology	3	.02	—	—	—	—	—	—
Internal Medicine—Nephrology	1	.01	—	—	—	—	—	—
Internal Medicine—Pulmonary Disease	3	.02	—	—	—	—	—	—
Internal Medicine—Rheumatology	4	.03	—	—	25.00	—	—	—
Neurology	226	1.43	1.77	1.33	1.33	.44	—	—
Neurology—Child	6	.04	—	—	—	—	—	—
Nuclear Medicine	10	.06	10.00	—	—	—	—	—
Obstetrics & Gynecology	884	5.58	4.86	3.28	.68	1.58	.57	.34
Obst. & Gyn.—Gynecologic Oncology	2	.01	—	50.00	—	—	—	—
Ophthalmology	380	2.40	1.05	1.05	.26	2.11	.26	.26
Otolaryngology	204	1.29	.49	1.47	—	.49	—	—
Pathology	265	1.67	1.13	.76	.76	1.89	.76	—
Pathology—Anatomic	4	.03	—	—	—	25.00	—	—
Pathology—Anatomic & Clinical	25	.16	—	—	—	8.00	—	—
Pathology—Clinical	3	.02	—	—	—	—	—	—
Pathology—Immunopathology	1	.01	—	—	—	—	—	—
Pathology—Neuropathology	1	.01	—	—	—	—	—	—
Surgery—Oral	2	.01	—	—	—	—	—	—
Pediatrics	1,369	8.64	3.07	1.39	.95	.88	.22	.07
Pediatrics—Primary	2	.01	—	—	—	—	—	—
Pediatrics—Cardiology	2	.01	—	—	—	—	—	—
Pediatrics—Critical Care	2	.01	—	—	—	—	—	—

School Graduates by Ethnicity and Gender

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Missing	
Women *n* = 79 .50% %	Men *n* = 150 .95% %	Women *n* = 320 2.02% %	Men *n* = 624 3.94% %	Women *n* = 30 .19% %	Men *n* = 57 .36% %	Women *n* = 64 .40% %	Men *n* = 137 .87% %	Women *n* = 4,090 25.82% %	Men *n* = 8,983 56.70% %	Women *n* = 55 .35% %	Men *n* = 130 .82% %
—	—	—	—	—	—	—	—	—	100.0	—	—
.21	1.24	1.03	5.17	.10	0.62	.10	.31	16.65	66.18	.72	.52
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	3.87	3.23	.65	—	—	.65	49.03	35.48	—	1.29
.27	.53	.80	3.71	—	.53	—	.27	23.08	61.27	—	1.06
.60	2.03	1.26	2.31	.11	.17	.22	.44	26.92	59.34	.22	.55
.49	1.01	2.89	5.11	.26	0.52	.43	.87	24.93	54.41	.35	.98
—	—	—	—	—	—	—	—	50.00	33.33	—	—
—	—	—	7.41	—	—	—	—	37.04	48.15	—	7.41
—	2.08	—	2.08	—	—	—	1.04	19.79	63.54	—	—
—	—	—	7.14	—	—	—	—	—	85.71	—	—
—	—	—	—	—	—	—	—	66.67	33.33	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	50.00	—	—	—	—	—	50.00	—	—
—	—	—	—	—	—	—	—	33.33	66.67	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	42.86	57.14	—	—
—	—	—	—	—	—	—	—	33.33	66.67	—	—
—	—	33.33	—	—	—	—	—	33.33	33.33	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	75.00	—	—
.44	1.77	1.33	3.98	.44	—	1.33	—	26.11	57.96	—	1.77
—	—	—	—	—	—	—	—	33.33	66.67	—	—
—	—	—	20.00	—	—	—	—	—	70.00	—	—
1.81	.57	3.05	2.83	.23	.11	.23	1.13	39.71	37.78	.57	.68
—	—	50.00	—	—	—	—	—	—	—	—	—
.26	.26	1.84	6.58	—	.26	—	.26	21.84	61.84	.79	1.05
—	.49	1.96	7.35	.49	—	—	—	10.29	76.47	.49	—
.76	.76	3.77	1.89	.76	.76	—	—	29.81	53.96	.38	1.89
—	—	—	25.00	—	—	—	—	50.00	—	—	—
—	—	4.00	8.00	—	—	—	4.00	24.00	48.00	4.00	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
1.02	.88	3.29	2.48	.29	.22	1.46	.73	46.68	35.14	.51	.73
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—

Continued

TABLE 2. PGY-3 Activities of 1987 U.S. Medical School

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)		→	$n = 361$	$n = 453$	$n = 85$	$n = 163$	$n = 30$	$n = 32$
Column Total (percentage)		→	2.28%	2.86%	.54%	.03%	.19%	.20%
	No.	%	%	%	%	%	%	%
Pediatrics—Endocrinology	1	.01	—	—	—	—	—	—
Pediatrics—Hematology & Oncology	3	.02	—	—	—	—	—	—
Pediatrics—Neonatal & Perinatal	2	.01	—	—	—	—	—	—
Physical Medicine & Rehabilitation	200	1.26	3.50	4.00	—	—	1.00	—
Preventive Medicine	8	.05	—	12.50	—	—	—	—
Preventive Medicine—Occupational	11	.07	9.09	27.27	—	—	—	—
Preventive Medicine—Public & General	1	.01	—	—	—	—	—	—
Preventive Medicine—Public Health	3	.02	—	—	—	—	—	—
Psychiatry	885	5.59	2.71	1.24	.68	.79	.23	.23
Psychiatry—Child	13	.08	—	—	—	—	—	—
Radiology	120	.76	.83	3.33	—	.83	—	—
Radiology—Diagnostic	550	3.47	.73	1.46	.18	1.27	—	—
Radiology—Nuclear	5	.03	—	—	—	—	—	—
Radiology—Oncology (Therapeutic)	97	.61	2.06	2.06	—	—	1.03	—
Surgery	1,085	6.85	1.20	4.61	.18	1.57	—	.37
Surgery—Preliminary	4	.03	—	25.00	—	—	—	—
Surgery—Gen. Vascular	3	.02	—	—	—	—	—	—
Surgery—Pediatric	2	.01	—	50.00	—	—	—	—
Surgery—Neurological	114	.72	1.75	.88	—	1.75	—	—
Surgery—Orthopedic	517	3.26	.58	2.32	—	.77	.19	.39
Surgery—Plastic	7	.04	—	—	—	—	—	—
Urology	188	1.19	1.06	2.66	—	.53	—	—
Transitional	14	.09	—	—	—	7.14	—	—
NOT IN RESIDENCY PROGRAM								
Practice patient care	604	3.81	1.99	3.15	.83	.83	—	.33
Research	67	.42	2.99	2.99	—	—	—	—
Not in GME But in medicine	5	.03	—	—	—	—	—	—
Administrative or faculty position	8	.05	—	—	12.50	—	—	—
Year off	55	.35	1.82	1.82	1.82	—	1.82	—
Missing	869	5.49	3.68	5.29	.81	.92	.12	.23
Non-medical activity	8	.05	—	—	—	—	—	—
Dismissed or departed	30	.19	3.33	—	—	3.33	—	—
Deceased	17	.11	5.88	11.76	—	—	—	—
COLUMN TOTAL	15,843	100.0						

Graduates by Ethnicity and Gender—*Continued*

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Missing	
Women *n* = 79 .50%	Men *n* = 150 .95%	Women *n* = 320 2.02%	Men *n* = 624 3.94%	Women *n* = 30 .19%	Men *n* = 57 .36%	Women *n* = 64 .40%	Men *n* = 137 .87%	Women *n* = 4,090 25.82%	Men *n* = 8,983 56.70%	Women *n* = 55 .35%	Men *n* = 130 .82%
%	%	%	%	%	%	%	%	%	%	%	%
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
.50	1.50	2.00	3.00	.50	1.00	1.00	1.00	22.50	58.00	—	.50
—	—	—	—	—	—	—	—	50.00	37.50	—	—
—	—	—	—	—	—	—	—	27.27	36.36	—	—
—	—	—	100.0	—	—	—	—	—	—	—	—
—	—	—	33.33	—	—	—	—	66.67	—	—	—
.45	1.02	1.70	2.26	.23	.45	.68	.90	37.74	47.68	.34	.68
—	—	—	—	—	—	—	—	30.77	53.85	7.69	7.69
—	1.67	5.83	3.33	—	—	—	.83	20.83	61.67	.83	—
—	.36	1.64	3.46	—	.18	.36	.91	24.00	64.73	.18	.55
—	—	20.00	—	—	—	—	—	40.00	40.00	—	—
1.03	—	4.12	7.22	—	1.03	—	—	15.46	63.92	—	2.06
.09	.65	1.57	5.53	.09	.28	.09	1.38	11.61	69.95	.18	.65
—	—	—	—	—	—	—	—	—	75.00	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	50.00	—	—	—
—	—	.88	8.77	—	—	—	.88	7.02	78.07	—	—
—	.39	.19	2.71	—	—	—	1.35	4.84	85.11	.19	.97
—	—	—	—	—	—	—	—	28.57	71.43	—	—
—	—	—	6.38	—	—	—	.53	7.98	79.26	—	1.60
—	—	—	—	—	—	—	—	28.57	64.29	—	—
.50	.83	.33	2.15	—	.50	.33	1.49	18.54	67.88	.17	.17
—	1.49	—	8.96	—	—	—	—	22.39	58.21	—	2.99
—	—	—	—	—	—	—	—	60.00	40.00	—	—
—	—	12.50	—	—	—	—	—	12.50	62.50	—	—
1.82	—	1.82	—	—	—	—	—	40.00	47.27	1.82	—
.35	.69	1.73	4.26	.23	.81	.69	2.53	24.40	51.67	.35	1.27
—	—	—	—	—	—	—	—	12.50	87.50	—	—
—	—	3.33	6.67	3.33	—	—	—	26.67	46.67	—	6.67
—	—	—	—	—	—	—	—	41.18	41.18	—	—

(The percentages in the main body of the table are row percentages.)

TABLE 3. PGY-4 Activities of 1987 U.S. Medical

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count) →			*n* = 361	*n* = 453	*n* = 85	*n* = 163	*n* = 30	*n* = 32
Column Total (percentage) →			2.28%	2.86%	.54%	1.03%	.19%	.20%
	No.	%	%	%	%	%	%	%
IN RESIDENCY PROGRAM								
Allergy & Immunology	24	.15	—	4.17	—	—	—	—
Immunology—Diagnostic & Laboratory	3	.02	—	—	—	—	—	—
Anesthesiology	1,066	6.73	2.16	4.03	.28	.66	.28	.09
Anesthesiology Critical Care	9	.06	—	—	—	—	—	—
Dermatology	189	1.19	3.18	—	1.06	.53	—	—
Emergency Medicine	217	1.37	2.77	3.23	—	1.38	—	—
Emergency Medicine—Internal Medicine	3	.02	—	—	—	—	—	—
Emergency Medicine—Sports Medicine	1	.01	—	—	—	—	—	—
Emergency Medicine—Pediatric	4	.03	—	—	—	—	—	—
Family Practice	214	1.35	4.21	1.87	.94	—	—	—
Family Practice—Geriatric Medicine	2	.01	—	—	—	—	—	—
Family Practice—Sports Medicine	4	.03	—	—	—	—	—	—
Internal Medicine	795	5.02	2.26	3.40	1.01	.63	.25	.25
Internal Medicine—Preliminary	4	.03	—	—	—	—	—	—
Internal Medicine—Primary Care	24	.15	—	—	—	—	—	—
Internal Medicine & Pediatrics	110	.69	3.64	4.55	1.82	1.82	—	—
Internal Medicine & Physical Medicine and Reh	15	.10	20.00	—	—	—	—	—
Internal Medicine & Psychiatry	2	.01	—	—	—	—	—	—
Internal Medicine—Adolescent Medicine	2	.01	—	—	—	—	—	—
Internal Medicine—Allergy & Immunology	12	.08	—	—	—	—	—	—
Internal Medicine—Cardiac Electrop	5	.03	—	—	—	—	—	—
Internal Medicine—Cardiovascular Disease	300	1.89	1.00	2.67	—	3.67	—	—
Internal Medicine—Clin Investigator Path	1	.01	—	—	—	—	—	—
Internal Medicine—Clin Nutrition	4	.03	—	—	—	—	—	—
Internal Medicine—Clinical Pharmacology	3	.02	—	—	—	—	—	—
Internal Medicine—Critical Care	19	.12	—	—	—	—	5.26	—
Internal Medicine—Endocrinology & Metab.	61	.39	—	—	—	—	—	1.64
Internal Medicine—Gastroenterology	201	1.27	—	2.49	.50	1.99	—	—
Internal Medicine—Geriatrics	29	.18	—	—	—	—	—	—
Internal Medicine—Hematology	21	.13	—	—	4.76	—	—	—
Internal Medicine—Hematology & Oncology	67	.42	1.49	—	—	4.48	—	—
Internal Medicine—Infectious Disease	74	.47	—	1.35	2.70	—	—	—
Internal Medicine—Medical Oncology	32	.20	—	3.13	—	—	—	—
Internal Medicine—Nephrology	75	.47	1.33	4.00	—	—	1.33	—
Internal Medicine—Pulmonary Disease	141	.89	—	3.55	—	2.84	—	—
Internal Medicine—Rheumatology	56	.35	—	—	1.79	—	—	1.79
Internal Medicine—Sports Medicine	4	.03	—	—	—	25.00	—	—
Internal Medicine—Transplant Medicine	1	.01	100.0	—	—	—	—	—
Neurology	250	1.58	2.00	1.20	1.60	.40	—	—
Neurology—Child	11	.07	—	—	—	—	—	—
Nuclear Medicine	10	.06	—	10.00	—	—	—	—
Obstetrics & Gynecology	888	5.61	4.84	3.38	.79	1.69	.45	.34
Obst. & Gyn.—Gynecologic Oncology	7	.04	—	14.29	—	—	—	—
Obst. & Gyn.—Reproductive Endocrinology	3	.02	—	—	—	—	—	—

School Graduates by Ethnicity and Gender

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Missing	
Women $n = 79$ .50%	Men $n = 150$ .95%	Women $n = 320$ .02%	Men $n = 624$ 3.94%	Women $n = 30$ .19%	Men $n = 57$ .36%	Women $n = 64$ .40%	Men $n = 137$ .87%	Women $n = 4{,}090$ 25.82%	Men $n = 8{,}983$ 56.70%	Women $n = 55$ .35%	Men $n = 130$ .82%
%	%	%	%	%	%	%	%	%	%	%	%
—	—	—	8.33	—	—	—	—	20.83	62.50	—	4.17
—	—	—	—	—	—	—	—	33.33	66.67	—	—
.19	1.31	1.22	4.97	.09	.56	.09	.28	17.17	65.38	.56	.66
—	—	—	—	—	—	—	—	22.22	77.78	—	—
—	—	3.18	2.65	.53	—	.53	1.06	45.50	40.21	—	1.59
—	1.38	1.38	1.84	—	.92	.46	—	21.20	63.59	—	1.84
—	—	—	—	—	—	—	—	33.33	66.67	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
2.34	1.87	1.40	1.87	—	—	.94	2.34	31.78	49.5	.94	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
.76	.88	3.02	4.78	.38	.38	.63	1.26	26.92	51.70	.25	1.26
—	—	—	25.00	—	—	—	25.00	—	50.00	—	—
—	8.33	—	4.17	—	—	—	—	16.67	70.83	—	—
—	1.82	—	1.82	—	—	—	.91	20.91	61.82	.91	—
—	—	—	13.33	—	—	—	6.67	20.00	40.00	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	8.33	—	25.00	—	—	—	—	8.33	58.33	—	—
—	—	—	—	—	—	—	—	20.00	80.00	—	—
—	2.00	.67	4.33	—	.67	.67	.33	11.33	70.33	—	2.33
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	10.53	—	—	—	—	10.53	73.68	—	—
—	—	6.56	1.64	—	—	1.64	—	31.15	55.74	—	1.64
.50	.50	2.49	10.95	—	—	—	—	8.46	71.14	—	.99
—	3.45	3.45	—	—	—	—	—	37.93	51.72	3.45	—
—	—	—	14.29	—	—	—	—	33.33	47.62	—	—
—	—	2.99	2.99	—	—	—	7.46	28.36	52.24	—	—
—	—	1.35	1.35	—	—	1.35	2.70	37.84	50.00	—	1.35
—	—	6.25	6.25	—	—	—	—	31.25	53.13	—	—
—	1.33	4.00	9.33	—	—	—	—	24.00	54.67	—	—
—	—	.71	5.67	.71	—	.71	2.13	13.48	68.79	.71	.71
—	1.79	3.57	1.79	—	—	3.57	1.79	39.29	42.86	—	1.79
—	—	—	—	—	—	—	—	—	75.00	—	—
—	—	—	—	—	—	—	—	—	—	—	—
.40	1.60	1.20	4.00	.40	.40	1.20	.40	26.00	57.60	—	1.60
—	—	—	—	9.09	—	—	—	27.27	45.45	—	18.18
—	—	10.00	30.00	—	—	—	10.00	10.00	30.00	—	—
1.69	.56	2.93	2.70	.23	.11	.23	1.24	39.53	38.06	.56	.68
—	—	14.29	—	—	—	—	—	57.14	14.29	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—

Continued

TABLE 3. PGY-4 Activities of 1987 U.S. Medical

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)		→	$n = 361$	$n = 453$	$n = 85$	$n = 163$	$n = 30$	$n = 32$
Column Total (percentage)		→	2.28%	2.86%	.54%	1.03%	.19%	.20%
	No.	%	%	%	%	%	%	%
Ophthalmology	402	2.54	.75	.99	.25	1.99	.25	.25
Otolaryngology	217	1.37	.92	1.38	.46	.46	—	—
Otolaryngology—Head & Neck Surgery	6	.04	—	—	—	—	—	—
Pathology	251	1.58	2.39	.80	.40	2.39	.80	—
Pathology—Anatomic	6	.04	—	—	—	—	—	—
Pathology—Anatomic & Clinical	38	.24	—	—	—	7.90	—	—
Pathology—Clinical	5	.03	—	—	—	—	—	—
Pathology—Dermatopathology	1	.01	—	—	—	—	—	—
Pathology—Forensic	2	.01	—	—	—	—	—	—
Pathology—Hematology	2	.01	—	—	—	—	—	—
Pathology—Immunopathology	1	.01	—	—	—	—	—	—
Pathology—Neuropathology	1	.01	—	—	—	—	—	—
Pathology—Radioisotopic	5	.03	—	—	—	—	—	—
Pediatrics	347	2.19	3.75	1.73	1.15	.58	.58	—
Pediatrics—Primary	9	.06	—	—	11.11	—	—	—
Pediatrics, Psychiatry & Child Psychiatry	4	.03	25.00	—	—	—	—	—
Pediatrics—Adolescent Medicine	10	.06	10.00	—	—	—	—	—
Pediatrics—Cardiology	40	.25	—	5.00	—	2.50	—	—
Pediatrics—Critical Care	16	.10	—	6.25	—	—	—	—
Pediatrics—Developmental Pediatrics	7	.04	—	—	—	—	—	—
Pediatrics—Diagnostic Laboratory Immunolo	3	.02	—	—	—	—	—	—
Pediatrics—Emergency Medicine	13	.08	—	—	—	—	—	—
Pediatrics—Endocrinology	8	.05	—	—	—	—	—	—
Pediatrics—Gastroenterology	7	.04	—	14.29	—	—	—	—
Pediatrics—Hematology & Oncology	30	.19	—	3.33	—	3.33	—	—
Pediatrics—Infectious Disease	13	.08	—	—	—	7.69	—	—
Pediatrics—Neonatal & Perinatal	54	.34	1.85	1.85	—	3.70	—	—
Pediatrics—Nephrology	10	.06	10.00	—	—	—	—	—
Pediatrics—Pulmonary	9	.06	—	11.11	—	—	—	—
Pediatrics—Rheumatology	2	.01	—	—	—	—	—	—
Physical Medicine & Rehabilitation	216	1.36	2.78	4.17	—	—	.46	—
Preventive Medicine	14	.09	7.14	14.29	—	—	—	—
Preventive Medicine—Clinical	1	.01	—	—	—	—	—	—
Preventive Medicine—Occupational	17	.11	—	17.65	—	—	—	—
Preventive Medicine—Public & General	1	.01	—	—	—	—	—	—
Preventive Medicine—Public Health	4	.03	—	—	—	—	—	—
Psychiatry	769	4.85	2.21	1.43	.65	.91	.26	.26
Psychiatry—Addiction Psychiatry	1	.01	—	—	100.0	—	—	—
Psychiatry—Child	114	.72	3.51	—	—	—	.88	—
Radiology	127	.80	1.58	3.15	—	.79	—	.79
Radiology—Diagnostic	579	3.66	.52	1.55	.17	1.21	—	—
Radiology—Nuclear	1	.01	—	—	—	—	—	—
Radiology—Oncology (Therapeutic)	115	.73	2.61	1.74	—	—	.87	—
Surgery	939	5.93	1.38	4.05	.11	.96	—	.43
Surgery—Preliminary	8	.05	—	—	12.50	—	—	—
Surgery—Critical Care	1	.01	—	—	—	—	—	—
Surgery—Gen. Vascular	3	.02	—	—	—	—	—	—

School Graduates by Ethnicity and Gender—*Continued*

Mexican American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Missing	
Women $n = 79$ .50%	Men $n = 150$ .95%	Women $n = 320$ 2.02%	Men $n = 624$ 3.94%	Women $n = 30$ .19%	Men $n = 57$ .36%	Women $n = 64$ .40%	Men $n = 137$ .87%	Women $n = 4{,}090$ 25.82%	Men $n = 8{,}983$ 56.70%	Women $n = 55$ .35%	Men $n = 130$ .82%
%	%	%	%	%	%	%	%	%	%	%	%
.25	.25	1.99	6.47	.25	.25	—	.25	21.64	62.44	.75	.99
—	.46	1.84	6.91	.46	—	—	—	10.60	76.04	.46	—
—	—	—	—	—	—	—	—	33.33	66.67	—	—
.80	.80	3.59	1.99	.40	.80	—	—	29.48	52.99	.40	1.99
—	—	16.67	16.67	—	—	—	—	33.33	33.33	—	—
—	—	2.63	7.90	—	—	—	2.63	36.84	39.47	2.63	—
—	—	—	—	—	—	—	—	20.00	80.00	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—
1.44	.58	3.46	2.02	.29	—	1.73	.87	47.55	33.43	.29	.58
—	11.11	—	—	—	—	—	—	55.56	22.22	—	—
—	—	—	—	—	—	—	—	25.00	50.00	—	—
—	10.00	—	—	—	—	—	—	70.00	10.00	—	—
—	—	2.50	7.50	—	2.50	—	—	22.50	57.50	—	—
—	—	—	—	—	—	—	—	56.25	37.50	—	—
—	—	—	—	14.29	—	—	—	71.43	14.29	—	—
—	—	—	66.67	—	—	—	—	33.33	—	—	—
—	—	7.69	7.69	—	—	—	—	15.38	69.23	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
—	—	—	—	—	—	14.29	—	—	71.43	—	—
—	—	6.67	—	—	—	—	—	46.67	40.00	—	—
—	—	—	—	—	—	—	7.69	30.77	53.85	—	—
—	—	1.85	5.56	—	—	—	1.85	37.04	44.44	1.85	—
—	—	—	—	—	—	—	—	30.00	60.00	—	—
—	—	—	—	—	—	—	—	22.22	66.67	—	—
—	—	—	—	—	—	—	—	50.00	50.00	—	—
.46	1.39	1.85	3.70	.46	.93	.93	2.32	22.22	57.41	.46	.46
7.14	—	—	—	—	—	—	—	21.43	50.00	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	—	—	—	—	—	—	—	41.18	41.18	—	—
—	—	—	100.0	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	75.00	25.00	—	—
.52	1.17	1.17	2.21	.26	.13	.78	.65	37.58	48.89	.26	.65
—	—	—	—	—	—	—	—	—	—	—	—
—	—	6.14	2.63	—	2.63	—	2.63	48.86	35.09	1.75	.88
—	1.58	3.15	—	—	—	.79	1.58	20.47	64.57	.79	.79
—	.35	1.90	3.80	—	.17	.35	1.04	24.01	64.25	.17	.52
—	—	—	—	—	—	—	—	100.0	—	—	—
.87	—	3.48	6.09	—	.87	—	1.74	16.52	63.48	—	1.74
.11	.53	1.38	5.86	—	.21	.11	1.28	11.50	71.25	.21	.64
—	—	—	12.50	—	—	—	—	12.50	62.50	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—

Continued

TABLE 3. PGY-4 Activities of 1987 U.S. Medical School

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)	→		*n* = 361	*n* = 453	*n* = 85	*n* = 163	*n* = 30	*n* = 32
Column Total (percentage)	→		2.28%	2.86%	.54%	1.03%	.19%	.20%
	No.	%	%	%	%	%	%	%
Surgery—Hand	1	.01	—	100.0	—	—	—	—
Surgery—Pediatric	1	.01	—	—	—	—	—	—
Surgery—Neurological	116	.73	1.72	.86	—	2.59	—	—
Surgery—Orthopedic	548	3.46	.37	2.37	—	.91	.18	.37
—Orthopedic—Hand Surgery	1	.01	—	—	—	100.0	—	—
Surgery—Plastic	20	.13	—	—	—	—	—	—
Surgery—Thoracic	1	.01	—	—	—	100.0	—	—
Urology	227	1.13	.88	3.97	—	.44	—	—
Transitional	4	.03	—	—	—	—	—	—
NOT IN RESIDENCY PROGRAM								
Practice patient care	3,743	23.63	2.38	2.27	.67	.72	.11	.27
Research	79	.50	1.27	6.33	1.27	1.27	—	—
Not in GME but in medicine	20	.13	—	10.00	—	5.00	—	—
Administrative or faculty position	274	1.73	3.29	1.83	.73	.73	.73	.37
Year off	42	.27	4.76	7.14	—	—	—	—
Missing	1,255	7.92	3.35	5.50	.56	1.12	.16	.24
Non-medical activity	13	.08	7.69	—	—	—	—	—
Dismissed or departed	89	.56	11.24	14.61	—	1.12	—	—
Deceased	17	.11	5.88	11.76	—	—	—	—
COLUMN TOTAL	15,843	100.0						

TABLE 4. PGY-1 Activities of 1991 U.S. Medical

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)	→		*n* = 516	*n* = 409	*n* = 102	*n* = 181	*n* = 17	*n* = 33
Column Total (percentage)	→		3.33%	2.64%	66%	1.17%	.11%	.21%
	No.	%	%	%	%	%	%	%
IN RESIDENCY PROGRAM								
Anesthesiology	277	1.79	2.17	2.89	—	1.08	.36	.36
Dermatology	14	.09	—	—	—	—	—	—
Emergency Medicine	402	2.60	3.98	1.74	1.74	.50	.25	.25
Emergency Medicine & Internal Medicine	8	.05	—	12.50	—	—	—	—
Emergency Medicine—Pediatric	3	.02	66.67	—	—	—	—	—
Family Practice	1,613	10.41	3.35	2.17	.37	.56	.25	.50
Internal Medicine	3,025	19.53	3.17	3.34	.63	1.42	.07	.10
Internal Medicine—Preliminary	1,598	10.32	3.13	2.50	.50	.81	.06	.25
Internal Medicine—Primary Care	223	1.44	2.69	1.79	1.35	1.79	—	—
Internal Medicine & Pediatrics	168	1.08	4.17	2.38	—	1.19	—	—
Internal Medicine & Physical Medicine and Rehabilitation	8	.05	—	12.50	—	12.50	—	—
Internal Medicine & Psychiatry	3	.02	—	—	—	—	—	—

Graduates by Ethnicity and Gender—*Continued*

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Missing	
Women $n = 79$ .50%	Men $n = 150$ .95%	Women $n = 320$ .02%	Men $n = 624$ 3.94%	Women $n = 30$ .19%	Men $n = 57$ .36%	Women $n = 64$ .40%	Men $n = 137$ .87%	Women $n = 4,090$ 25.82%	Men $n = 8,983$ 56.70%	Women $n = 55$ .35%	Men $n = 130$ .82%
%	%	%	%	%	%	%	%	%	%	%	%
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—
—	—	.86	8.62	—	—	—	.86	7.76	76.72	—	—
—	.37	.18	2.56	—	—	—	1.64	4.38	85.58	.18	.91
—	—	—	—	—	—	—	—	—	—	—	—
—	—	10.00	—	—	—	—	—	20.00	70.00	—	—
—	—	—	5.73	—	—	—	.44	6.17	81.06	—	1.32
—	—	—	—	—	—	—	—	25.00	75.00	—	—
.64	1.42	1.90	3.55	.08	.40	.37	.61	28.40	55.36	.27	.59
—	1.27	6.33	1.27	1.27	—	—	—	20.25	58.23	—	1.27
—	—	—	—	—	—	—	—	25.00	60.00	—	—
.73	.37	3.29	1.83	.37	.73	1.10	.73	36.13	45.62	1.10	.37
2.38	2.38	—	—	2.38	—	—	—	35.71	45.24	—	—
.48	.80	2.63	4.30	.48	.88	.48	.88	29.56	46.69	.48	1.43
—	—	—	—	—	—	—	—	38.46	53.85	—	—
—	1.12	3.37	—	—	—	—	—	22.47	46.07	—	—
—	—	—	—	—	—	—	—	41.18	41.18	—	—

(The percentages in the main body of the table are row percentages.)

School Graduates by Ethnicity and Gender

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Ethnicity Missing	
Women $n = 102$ .66%	Men $n = 166$ 1.07%	Women $n = 627$ 4.05%	Men $n = 1,072$ 6.92%	Women $n = 36$ .23%	Men $n = 71$ .46%	Women $n = 67$ .43%	Men $n = 116$ .75%	Women $n = 4,069$ 26.27%	Men $n = 7,791$ 50.30%	Women $n = 42$ .27%	Men $n = 72$ .47%
%	%	%	%	%	%	%	%	%	%	%	%
.36	1.44	2.53	10.11	—	.36	.36	.72	17.69	59.57	—	—
—	7.14	14.29	—	—	—	—	—	14.29	64.29	—	—
1.00	1.00	1.24	3.73	—	1.24	.25	—	18.66	63.68	.25	.50
—	—	—	—	—	—	—	—	25.00	62.50	—	—
—	—	—	—	—	—	—	—	—	—	—	33.33
.74	1.36	3.10	3.47	.06	.31	.43	.31	31.74	50.77	.43	.06
.56	.79	4.93	9.16	.36	.50	.63	1.59	23.97	47.90	.20	.69
.44	1.06	5.07	8.76	.38	.50	.19	.44	24.41	50.44	.44	.63
.90	.45	4.93	9.87	—	.90	.45	—	30.94	43.05	—	.90
1.19	1.19	5.36	3.98	—	—	.60	—	31.55	48.81	.60	—
—	—	—	—	—	12.50	25.00	12.50	25.00	—	—	—
—	—	—	33.33	—	33.33	—	—	—	33.33	—	—

Continued

TABLE 4. PGY-1 Activities of 1991 U.S. Medical

			Black		Other Hispanic		Native American	
			Women	Men	Women	Men	Women	Men
Column Total (count)		→	*n* = 516	*n* = 409	*n* = 102	*n* = 181	*n* = 17	*n* = 33
Column Total (percentage)		→	3.33%	2.64%	.66%	1.17%	.11%	.21%
	No.	%	%	%	%	%	%	%
Neurology	35	.23	2.86	2.86	—	—	—	—
Nuclear Medicine	5	.03	—	—	—	—	—	—
Obstetrics & Gynecology	1,052	6.79	5.80	2.76	.67	1.24	.19	.29
Ophthalmology	21	.14	—	—	—	—	—	—
Otolaryngology	78	.50	1.28	—	—	1.28	—	—
Pathology	306	1.98	2.61	—	2.29	3.27	.33	.33
Pathology—Anatomic	5	.03	—	—	—	—	—	—
Pathology—Anatomic & Clinical	3	.02	—	—	—	—	—	—
Pathology—Clinical	4	.03	—	—	—	—	—	—
Surgery—Oral	13	.08	—	—	—	—	—	—
Pediatrics	1,471	9.50	5.03	.95	.95	.48	—	.07
Pediatrics—Primary	21	.14	—	—	—	—	—	—
Pediatrics, Psychiatry & Child Psychiatry	8	.05	—	—	—	—	—	—
Pediatrics—Neonatal & Perinatal	1	.01	—	—	—	—	—	—
Pediatrics—Sports and Fitness Medicine	1	.01	—	—	—	—	—	—
Physical Medicine & Rehabilitation	72	.46	1.39	1.39	—	—	—	1.39
Preventive Medicine	4	.03	—	—	—	—	—	—
Psychiatry	715	4.62	5.46	1.12	.84	.98	.14	.28
Psychiatry—Child and Adolescent	7	.05	14.29	—	—	—	—	—
Radiology	10	.06	—	—	—	—	—	—
Radiology—Diagnostic	308	1.99	.33	2.27	—	.33	—	—
Radiology—Oncology (Therapeutic)	8	.05	12.50	—	—	—	—	—
Surgery	1,233	7.96	1.54	3.97	.57	2.51	.08	.08
Surgery—Preliminary	782	5.05	1.79	4.73	.38	1.79	.38	.38
Surgery—Neurological	56	.36	—	8.93	—	—	—	—
Surgery—Orthopedic	434	2.80	.69	2.07	.23	1.61	—	.23
Surgery—Plastic	8	.05	12.50	—	—	—	—	—
Urology	106	.68	—	2.83	—	.94	—	—
Transitional	1,128	7.28	3.55	2.84	.98	.89	—	.27
NOT IN RESIDENCY PROGRAM								
Research	88	.57	2.27	2.27	—	1.14	—	—
Not in GME but in medicine	8	.05	25.00	12.50	—	—	—	—
Administrative or faculty position	1	.01	—	—	—	—	—	—
Year off	68	.44	2.94	1.47	1.47	—	—	—
Missing	63	.41	4.76	12.70	3.18	1.59	—	—
Non-medical activity	24	.15	20.83	4.17	—	—	—	—
COLUMN TOTAL	15,489	100.0						

School Graduates by Ethnicity and Gender—*Continued*

Mexican-American		Asian or Pacific Islander		Mainland Puerto Rican		Commonwealth Puerto Rican		White		Ethnicity Missing	
Women $n = 102$ .66%	Men $n = 166$ 1.07%	Women $n = 627$ 4.05%	Men $n = 1072$ 6.92%	Women $n = 36$ .23%	Men $n = 71$ .46%	Women $n = 67$ .43%	Men $n = 116$ .75%	Women $n = 4{,}069$ 26.27%	Men $n = 7{,}791$ 50.30%	Women $n = 42$ .27%	Men $n = 72$ .47%
%	%	%	%	%	%	%	%	%	%	%	%
—	—	—	2.86	—	—	2.86	—	22.86	62.86	—	2.86
—	—	—	—	—	—	—	—	20.00	80.00	—	—
1.24	1.33	6.18	4.37	.19	.38	.38	.86	41.16	32.51	.29	.19
—	—	—	4.76	—	—	9.52	4.76	4.76	71.43	—	4.76
—	—	1.28	11.54	—	—	—	—	15.38	69.23	—	—
.33	.98	1.96	3.60	—	—	.33	—	34.97	48.04	.65	.33
—	—	—	—	—	—	—	—	20.00	80.00	—	—
—	—	—	33.33	—	—	—	—	33.33	—	—	33.33
—	—	—	—	—	—	—	—	25.00	75.00	—	—
—	7.69	—	—	—	—	—	—	7.69	76.92	7.69	—
1.50	.82	7.48	3.20	.48	.20	1.02	.41	46.77	30.12	.34	.20
9.52	—	14.29	—	—	—	—	—	47.62	28.57	—	—
—	—	—	12.50	—	—	—	—	25.00	62.50	—	—
—	—	—	—	—	—	—	—	100.0	—	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
—	1.39	4.17	11.11	1.39	2.78	1.39	1.39	23.61	48.61	—	—
—	—	—	—	—	25.00	—	—	25.00	50.00	—	—
.98	.70	3.36	4.62	.70	.56	.42	.56	36.50	42.24	.14	.42
—	—	—	—	14.29	—	—	—	14.29	57.14	—	—
—	—	—	—	—	—	10.00	30.00	20.00	40.00	—	—
—	.97	2.27	7.47	—	—	—	.33	20.45	65.26	—	.33
—	—	—	12.50	—	—	—	—	25.00	50.00	—	—
.32	1.38	2.60	9.25	.08	.49	.08	.89	14.11	61.48	.16	.41
.26	1.54	1.66	9.59	.13	.90	—	.90	8.95	66.11	.13	.38
—	—	1.79	10.71	—	1.79	—	1.79	10.71	64.29	—	—
—	—	—	6.45	—	—	—	.23	6.68	81.34	—	.46
—	—	—	—	—	—	—	—	12.50	75.00	—	—
.94	—	—	13.21	—	—	—	—	11.32	70.75	—	—
.36	1.86	3.37	8.33	—	.36	.09	.53	18.35	57.54	.18	.53
—	1.14	4.55	9.09	—	—	—	—	23.86	54.55	—	1.14
—	—	12.50	—	—	—	—	—	12.50	37.50	—	—
—	—	—	—	—	—	—	—	—	100.0	—	—
1.47	1.47	4.41	4.41	—	—	1.47	—	44.12	27.94	2.94	5.88
—	—	3.18	3.18	—	1.59	1.59	3.18	30.16	33.33	—	1.59
—	—	—	8.33	—	—	—	—	25.00	37.50	4.17	—

(The percentages in the main body of the table are row percentages.)

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Impact of Physicians' Part-time Status

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Impacts of Decreased U.S. Training for FMGs

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Publishing Services: **Hanley & Belfus, Inc.**
210 South 13th Street, Philadelphia, PA 19107

NOVEMBER 1991
VOLUME 66
NUMBER ELEVEN

ACADEMIC MEDICINE

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; $130/2 years; $185/3 years; and $8.00 per single copy.

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Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
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SPECIAL ARTICLES

LELIA B. HELMS, J.D., Ph.D., and CHARLES M. HELMS, M.D., Ph.D.

Forty Years of Litigation Involving Residents and Their Training: I. General Programmatic Issues

Abstract—An analysis of reported state and federal adjudication from 1950 through 1989 was undertaken to identify issues and trends in litigation involving residents and their training. Of the 174 decisions cited, 38 (22%) involved disputes over general programmatic issues. The great majority of these addressed academic administration, especially issues arising from dismissals of residents. During more recent periods, residency programs have accommodated to judicial scrutiny of dismissals and have prevailed more often than claimants in litigation. Successful accommodation by residency programs has apparently not operated as a disincentive to further litigation, however. *Acad. Med.* 66(1991):649–655.

In the published proceedings of a recent American Medical Association conference the courts were described as one of the "new regulators" of graduate medical education.[1] Potential areas of legal liability for graduate medical education were identified in the context of exploring the growing regulation of physician-training programs. The absence of systematic information about litigation involving residents and residency programs was described. This information vacuum hinders a clearer understanding of this area.

In this paper we review litigation reported over the past 40 years involving residents and residency programs. We apply a method used earlier to identify and classify litigation involving medical students and medical schools.[2,3] By employing this analytic framework, we hoped to gain insight into the range and variety of issues in graduate medical education generating litigation, to discern trends in litigation with their policy implications, and to elicit a broader understanding of similarities and differences in issues and problems facing educators administering undergraduate and graduate medical education programs.

Method

Employing the Westlaw computerized legal research service, we identified state and federal cases involving interns, residents, fellows, or programs of graduate medical education for the 40-year period 1950–1989. The two topical indexes employed to search the Westlaw database were Hospitals and Colleges, and Universities. The key words employed were intern, resident, fellow, graduate medical education, postgraduate medical education, and residency training program.

Within the legal system only reported litigation may serve as precedent for resolving disputes. The cases identified by this survey are those to which courts refer for guidance in making decisions. However, there are several limitations inherent in this research method. First, only reported court decisions are included. The actual number of cases filed, withdrawn, settled, or decided by a trial court cannot be accurately determined, since present judicial information systems do not collect such information either comprehensively or systematically. Data from one state indicate that as few as 1% of cases filed with a court reach the appellate level, where a written decision might be included in the legal reporting system.[4,5] Clearly, reported court decisions constitute only the tip of the iceberg of litigation. Second, differential reporting by the legal reporting system introduces bias. State court reporting systems generally include only appellate-level decisions. The federal reporting system captures many appellate decisions as well as some district (trial) court decisions. Thus, a selective bias towards appellate-level decisions is expected. Despite these limitations, an overview of reported decisions should be helpful in discerning the issues litigated in graduate medical education and general patterns of litigation.

Results and Analysis

Reported litigation has undergone substantial changes in volume as well as in a broadening of issues litigated over the 40-year study period.

Volume of Litigation

A chronological summary of reported litigation involving residents and issues of graduate medical education during the 40-year study period can be found in Table 1. From 1950 through 1989, 174 cases were reported. Of these, 36 (21%) were de-

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Table 1

Litigation Involving Residents

	State Court		Federal Court		
Period	General	Malpractice	General	Malpractice	Total
1950-1954	—	4	—	1	5
1955-1959	—	8	—	1	9
1960-1964	—	8	—	—	8
1965-1969	—	7	—	3	10
1970-1974	3	5	1	4	13
1975-1979	3	21	4	2	30
1980-1984	3	26	4	4	37
1985-1989	13	37	7	5	62
Total	22	116	16	20	174

cided in federal courts and 138 (79%) in state courts. Of the reported federal cases, 24 (67%) were decisions at the district court level, 12 (33%) were decisions at the circuit (appellate) level, and none was decided by the United States Supreme Court. The number of reported cases has grown dramatically, from 13 cases in 1970-1974 to 62 cases in 1985-1989, nearly a fivefold increase. The growth has occurred primarily in state court cases. Medical malpractice suits were the great majority (78%) of cases reported; this distinct body of litigation is discussed in a separate paper.[6]

In this paper we focus on the 38 state and federal cases (22%) related to programmatic issues, identified by year under "General" in Table 1. These cases litigate issues involving the organization, administration, and support of graduate medical education programs. Interestingly, all 38 general cases identified in this survey were decided after 1970, the year when the number of active applicants for National Residency Matching Program residency positions began to rise dramatically from a "baseline" of approximately 9,000 to its current level of approximately 19,000.[7,8] Twenty cases (53%) were decided after 1985, indicating a sharp growth in recent litigation in this area.

Issues of Litigation

Table 2 provides information about specific issues giving rise to litigation over the study period. Thirty-one cases related to academic administration accounted for the great majority (82%) of programmatic litigation. These cases increased in number consistently and dramatically over the last 20 years of the study period, from one in 1970-1974 to 18 in 1985-1989. The seven remaining cases litigated issues of collective bargaining, taxation or reimbursement, and wrongful interference with contractual relations.

Dismissals. Suits involving dismissal of residents from training programs were the majority (58%) of the 31 cases related to academic administration. Of the 18 dismissal cases, 11 were litigated in 1985-1989, a period that witnessed striking growth in litigation related to the financing of undergraduate medical education.[3] This recent increase in dismissal litigation by residents may have been driven, in part, by the same economic forces. That is, residents with substantial indebtedness related to undergraduate medical education expenses and threatened with loss or reduction in present and future income may be increasingly willing to challenge dismissals by graduate training programs.

Ten dismissal cases litigated whether due process is required in dismissal and the nature of that process. Before 1983 due process was the only issue litigated in dismissals. Since then, however, issues of sovereign immunity, defamation, contract, relationship to procedures set forth in a collective bargaining agreement, and discrimination have also been addressed within the context of dismissal. Among the 18 dismissal cases, three cases alleged discrimination based on sex, and one alleged discrimination based on national origin.[9] All four discrimination cases were reported since 1985. This may point to a pattern, similar to that reported for undergraduate medical education, of a broadening of the issues raised by plaintiffs' attorneys to include decisions made before or ancillary to the final stage of dismissal.[2]

Admission. In contrast to dismissal cases, only two admission cases were

Table 2

Issues Giving Rise to Litigation

	1970-1974		1975-1979		1980-1984		1985-1989		
	Federal	State	Federal	State	Federal	State	Federal	State	Total
Academic administration	—	1	3	2	4	3	6	12	31
Collective bargaining	—	1	1	—	—	—	—	1	3
Tax/finance	1	1	—	—	—	—	1	—	3
Other	—	—	—	1	—	—	—	—	1
Subtotal	1	3	4	3	4	3	7	13	38
Total	4		7		7		20		38

identified: one alleging discrimination based on handicap and a second challenging limits upon admission of osteopathic physicians to a cardiovascular fellowship program.[10] The paucity of suits related to admission relative to dismissals may be explained in part by the large number of residency positions available nationally and the highly structured and confidential nature of the selection mechanisms employed by the National Residency Matching Program. These forces may enhance the likelihood of medical students' achieving an acceptable position.

Table 3

Prevailing Party in Litigation

Issue	Resident	Other Party	Unclear/Mixed	Total
Academic administration	7	20	4	31
Collective bargaining	1	2	—	3
Tax/finance	1	2	—	3
Other			1	1
Total	9	24	5	38

Government monitoring and regulation. Seven cases related to academic administration dealt primarily with the appropriate role of government in monitoring or regulating programs of graduate medical education. Two decisions addressed challenges to terminations of residency programs by the Veterans Administration.[11] One case addressed the power of the state medical board to set requirements for the supervision of residents,[12] while another challenged state-set salary rates.[13] A fifth case, brought by residents, sought to rescind a long-standing contract between the County of Los Angeles and the University of Southern California for the employment of residents in a county health care facility by applying county requirements regarding cost-effectiveness.[14] A sixth challenged a state's application of changes in licensing requirements for residents on an ex post facto basis.[15] The last dealt with a suit brought by a New York labor organization representing residents, interns, and fellows questioning regulations limiting the number of hours and establishing minimum operating standards for hospitals.[16]

ACGME accreditation. Two cases under academic administration involved challenges by training programs to withdrawal of their accreditation by the Accreditation Council for Graduate Medical Education (ACGME). In one, a hospital with a religious affiliation alleged that the withdrawal of accreditation from their program in obstetrics and gynecology was impermissibly based upon the hospital's religious opposition to sterilization and abortion.[17] In the second, a medical center challenged the authority of the ACGME, an unincorporated association, to withdraw accreditation from its surgical residency program.[18]

Safety of residents. The final two cases involving academic administration arose from the same set of operative facts and focused on the same legal objective, establishing the responsibilities of residency training programs to provide for the safety and protection of residents. One suit approached this through arguments grounded in federal law, while a second argued negligence by program administrators under state law.[19]

Collective bargaining. Three cases litigated issues of collective bargaining directly. The only federal case arose under the jurisdiction of the National Labor Relations Board and decided the question of whether residents were hospital employees able to organize a union.[20] Cases involving residents in public hospitals are governed by state laws that regulate the rights of state employees to organize and bargain collectively over the terms and conditions of their employment. California and Michigan have faced litigation by residents over issues directly related to collective bargaining.[21] In several of the previously cited academic administration cases, collective bargaining was indirectly involved through a labor organization representing residents or through interpretation of a provision of a collective bargaining agreement in the context of a dismissal.[12,14,16,22]

Taxation or reimbursement. Three cases addressed problems of taxation or reimbursement. Federal courts resolved two: whether the compensation paid to residents was taxable salary or an educational scholarship[23]; and whether Medicare regulations provided for appropriate reimbursement for outpatient care by residents.[24] A state court decided the third: whether a community could levy property taxes on houses supplied to residents by their employer, a local hospital.[25]

Wrongful interference. Finally, a case classified as "other" arose when a supervising physician brought a claim against a resident for wrongful interference with contractual relations.[26] The physician argued that testimony provided by the resident to the hospital's peer review committee caused the eventual removal of his staff privileges. This case was categorized separately, since it involved a personal claim by one physician against another, the resident. Although it did not directly address programmatic issues, it clearly has implications for relationships between faculty and housestaff.

Outcome of Litigation

Most of the 38 cases may be categorized by outcome, i.e., the winning party (Table 3). Residents have prevailed in only nine (24%) of the cases. The party opposing the resident has won in 24 (63%) of the cases. In five (13%) of the cases, a winner could not be determined, either because the issue was narrowly procedural or because a remand was required to retry disputed facts. Residents prevailed in only seven (23%) of the 31 cases related to academic administration.

Dismissals. Of the 18 challenges to the dismissal of a resident, the program's decision was overturned in only four (22%) of the cases, while the outcome was unclear or mixed in two (11%) of the cases.[27,28] This already small proportion of successful challenges to dismissal by residents may be decreasing over time: in 1970-1979, residents prevailed in three of five suits, whereas in 1980-1989 a resident prevailed in only one of 13 suits. Early successes enjoyed by residents addressed issues of due process and procedural protection in dismissals and outlined minimal requirements for programs in dismissal of residents.[27] Since these decisions, residents have prevailed less frequently. Two cases, both alleging procedural violations, had mixed outcomes.[28] In one case of dismissal, sex discrimination was confirmed.[29] In three other cases alleging discrimination, none was found.[30]

Admission. In cases litigating admission, outcomes were mixed. One resident prevailed in an allegation of handicap discrimination, but another lost a challenge to the legitimacy of requiring allopathic rather than osteopathic training.[7]

Government monitoring and regulations. The courts have generally sustained the exercise of regulatory authority by government over programs of graduate medical education. A challenge to a state medical board's regulation that established standards for supervision of residents performing surgery failed.[12] The terms of a contract between a residency program and the county to provide care to county health care facilities were interpreted to sustain the county's position.[14] An attempt to limit the authority of the Commissioner of Health in New York was rejected as the court approved regulations limiting the hours worked by residents.[16] In one case residents did succeed in challenging the retroactive application of state licensing requirements for graduates of foreign medical schools, which excluded such graduates from receiving temporary certificates of registration after being accepted into training programs.[15] In another case, the outcome of litigation by a program challenging residents' salaries set by a state board was unclear. At issue was the question of how to compute the average number of hours worked weekly by residents.[13]

ACGME accreditation. In two cases challenging withdrawal of accreditation, courts sustained the ACGME in one, but required additional litigation in the second. In the first case a New York court upheld a determination that a medical center had not complied with the general academic requirements for a surgery residency program as set forth by the ACGME and evaluated by its Residency Review Committee. The ACGME was found to have acted reasonably and provided sufficient due process in its procedures for evaluation and appeal.[18] In the second, a federal court granted to a Baltimore hospital a preliminary injunction forbidding withdrawal of accreditation from its program in obstetrics and gynecology. The court reasoned that the withdrawal constituted "state action" for which a hospital could sustain a civil rights action against ACGME alleging that the termination was based on religious discrimination. For purposes of this review, this case was classified as an unclear outcome. In 1990, however, a decision not within the time frame for inclusion in this study, a federal court resolved the substantive issues raised by this case and sustained the ACGME's withdrawal of accreditation. The court found that the ACGME did not violate the free exercise of religion clause of the Constitution by refusing to exempt a Roman Catholic hospital from the requirement of teaching family planning procedures in its residency training program.[17]

Safety of residents. Efforts to establish the liability of a training program for an alleged failure to provide for the safety of a resident murdered while providing care to a patient in an emergency room were rejected in both state and federal courts.[19] The estate of the deceased resident was unsuccessful in claiming that federal civil rights statutes were violated and that the program was negligent under the state's tort claim statute.

The limited numbers and diversity as well as the mixed outcomes in cases included in collective bargaining, tax/finance, and other categories limit the significance of conclusions that may be drawn from these outcome data.

Collective bargaining. The right of residents to organize and bargain collectively in public hospitals was sustained under the state law in California in 1986, but denied under Michigan law in 1972.[21] Residents working in private hospitals, covered by federal rather than state law, failed in their claim that the National Labor Relations Board should extend its jurisdiction to cover their proposed union and permit collective bargaining. In that case, the National Labor Relations Board classified residents as employees, but found that they were excluded under the National Labor Relations Act.[20]

Taxation or reimbursement. The University of Cincinnati succeeded in its challenge to the manner in which Medicare calculated compensation for care provided by residents.[24] However, residents' salaries were held to be taxable income, not educational scholarships, while a hospital was required to pay property tax on housing supplied to residents.[23,25]

Wrongful interference. Finally, in a case with implications for relations between residents and staff, a court in remanding for retrial found that testimony given by a resident to a peer review committee deliberating whether to revoke a physician's staff privileges was not entitled to an absolute privilege from disclosure in a suit for wrongful interference with contractual relations. It was determined that if any motivation to "get even" could be attributed to the resident in providing such testimony, then any privilege would disappear.[26]

Discussion

Reported litigation involving residents and programs of graduate medical education increased substantially over the past 40 years, largely related to malpractice suits. However, growth in reported litigation in general programmatic areas has occurred as well in the past five years, especially over the issue of dismissal.

In 1978, the Supreme Court in *Horowitz* addressed the issue of dismissal procedures for medical students. The Court found that informal procedures were sufficient in student dismissal proceedings and deferred to evaluations by faculty in matters of academic judgment.[31] Since *Horowitz*, suits involving residents' dismissals have been treated similarly. Courts have rather consistently sustained the rights and responsibilities of faculty to evaluate and to dismiss a resident based on academic performance.

A recurrent question in dismissal cases, however, has been whether residents should be classified as employees rather than students. If classified as contractual employees, residents could require greater procedural protections. In the three early dismissal cases in which residents prevailed, the residents' status as employees or students was never clearly resolved, whereas in the 15 cases reported since 1980, lower level courts have usually classified residents as students.

Nevertheless, some ambiguity persists. As recently as 1988, the Federal Fifth Circuit Court sustained dismissal of a dental resident under minimal academic procedures but found no compensable damage because the program "bought out" the time remaining in a dental resident's contract of employment.[32] Similarly, when a program failed to comply with a 30-day notice-of-termination procedure in a resident's contract, the court required an additional 30 days of compensation.[33] Experience to date suggests, therefore, that academic procedures may be used to dismiss a resident, but that contract law prevails in dealing with his or her compensation.

Economic incentives created by the burden of growing debt of doctors-in-training may operate to motivate residents to litigate when dismissal will foreclose or delay opportunities for debt repayment. In at least one case identified in this study, the plaintiff, while contesting his dismissal from the third year of residency training, was simultaneously involved in bankruptcy proceedings.[33] The number of challenges to residency dismissal decisions has shown recent signs of growth. This has occurred despite the fact that the courts have more often than not sustained actions by training programs as meeting judicial standards. The success of training programs does not appear to have operated as a disincentive to further litigation.

Whether, as they have begun to do in medical student dismissal cases, plaintiffs' attorneys will ask courts to look beyond due process in dismissal procedures and to look more closely at the decision making leading to the final step of dismissal is unclear at this point.[2] There is preliminary evidence that a pattern of diversification of litigated issues may be unfolding in resident dismissal suits. Four cases of discrimination that have focused on issues of bias in decision making have been litigated during the last five years.[9] One of these alleged the discrimination to have occurred during faculty evaluation of performance, not in the dismissal proceeding, and suggested that requirements of due process be applied to faculty evaluation.[34] Another case not claiming discrimination argued that decisions about dismissal should be preempted by the grievance procedures in a collective bargaining agreement, when there is one, rather than being left to the faculty or program administration.[22] Neither claim was sustained by the courts.

Residency programs are exposed to litigation from sources other than their own trainees. These liabilities are illustrated by several cases identified in this study. The rights of residents to organize and bargain collectively by law in several states expose programs operated by public hospitals to a broad range of legal issues. To date, nongovernmental (private) hospitals or those hospitals owned by a municipality but operated by a private contractor have not been subject to the complex requirements of collective bargaining and the associated potential for litigation.[20] When available as an option, union membership may provide residents with economic and legal resources necessary to engage in and sustain litigation. Unions have challenged state regulations on hours (as too onerous), as well as training agreements for the provision of service in a variety of institutions.[14,16] Additionally, procedures established by collective bargaining agreements may be interpreted as being incorporated into the dismissal procedures for residents.[22] Certainly, the debt burden of residents described earlier gives residents and residents' organizations every incentive to fight adverse decisions about dismissals and to expand their role in assuring favorable policies affecting the terms and conditions of their employment.[16,33]

The potential for divisiveness between residents and staff physicians arising over the issue of peer review is illustrated by one case identified in this survey.[26] While encouraging the professional review of standards of practice is the objective of peer review legislation, there may be unintended effects upon physicians in training if they become involved in such proceedings. Residents must understand the risks of liability, particularly in states where confidentiality and immunity issues have not been thoroughly litigated.

Regulations by state agencies responsible for providing and monitoring health care have provoked a growing number of challenges by residency programs and organizations. When contesting state regulatory requirements in this area, programs have enjoyed little success in the few cases identified in this survey. Although programs retain some discretion to determine qualifications for admission, the state's regulatory authority has been sustained in arguments that limit the number of hours worked by residents, that set rules for reimbursement, and that establish standards of supervision.[12,13,16] The courts have viewed state government intervention at these levels as a legitimate exercise of regulatory authority under existing statutes. Only the retroactive denial of certificates of registration by a state exercising its authority to upgrade minimum qualifications for medical practice was found to have substantially prejudiced the rights of residents to participate in residency programs.[15]

Finally, the role of the ACGME has been the focus of recent litigation when hospital training programs have failed to meet the criteria for accreditation. In two cases where the ACGME withdrew accreditation, both the procedures relied upon in making decisions about accreditation and the substance of the decisions made by the Residency Review Committee were sustained by the court. In one, the court deferred to the academic expertise of the ACGME both to set standards for and to evaluate programs of professional medical education.[18] In the second decision, the action of a private, nongovernmental organization, ACGME, in withdrawing accreditation was found to constitute state action although later sustained as within both the First and Fourteenth Amendments.[17] The finding that ACGME acts as an arm of the state in making decisions on program accreditation raises concerns for both attorneys and medical educators. However, both decisions established a precedent that may be viewed as one of support for the leadership role of the ACGME in graduate medical education and its relationship to state agencies that register training programs. Nonetheless, these suits illustrate the complexity of the legal environment within which graduate medical education functions.

That graduate medical education faces pressures from a growing number of sources interested in fiscal and regulatory reform is not news. While substantial progress has been made in understanding the environmental factors conducive to the regulation of physician training programs, no data have been systematically compiled to assist in understanding the impact of the judiciary upon the education of residents.[1] It is clear from the present study that the courts have become involved with growing frequency in disputes arising from the administration of programs of graduate medical education. Indeed, viewing their role as a "new regulator" of such programs is not unreasonable if broadly construed.[1] However, closer examination of litigation reveals that courts in most instances serve primarily to confirm rather than to initiate policies made by other participants making decisions affecting graduate medical education. Only in the area of dismissals of residents have courts elected to wrestle with substantive issues of educational decision making. In these cases, after requiring some procedural protections for residents in the mid 1970s, the courts have rather consistently sustained the faculty's authority in dismissal, primarily by consistently viewing residents as students rather than employees. In other areas, however, the courts perform their traditional function of statutory interpretation. In this role, courts, more often than not, serve to sustain government policy and actions rather than to overturn them. On occasion, however, the courts provide a forum for programs to challenge and rectify perceived mistakes. As the magnitude of regulatory reform in health care and the costs of undergraduate and graduate medical education increase, so will the frequency of challenges by both residents and training programs through the courts. Thus, in addition to serving the more familiar role of monitoring programs for compliance with standards of due process and fairness, the courts will also provide access to policymakers when traditional channels fail.

The authors thank William Hesson, senior assistant director of the University of Iowa Hospitals and Clinics, for his thoughtful and perceptive review of this research.

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JANET M. CORRIGAN, Ph.D., and LAURIE M. THOMPSON, M.H.S.A.

Involvement of Health Maintenance Organizations in Graduate Medical Education

Abstract—Prepaid health care plans are likely to play an important part in the current transition from inpatient to ambulatory care training of physicians, because such plans enroll one in seven Americans. In the spring of 1990, the Group Health Association of America conducted a survey of health maintenance organizations (HMOs) to assess their level of involvement in graduate medical education (GME). A questionnaire was sent to the 481 HMOs in the United States that had been operational for at least four years; 58% responded. Fifteen percent (42 HMOs) indicated that they were directly involved in GME. The majority of these 42 indicated that they had an agreement with an academic medical center (AMC) or a teaching hospital to serve as an ambulatory care rotation site. About one-sixth of the 42 HMOs had been approved by the Accreditation Council for Graduate Medical Education to serve as a sponsoring organization. HMOs directly involved in GME were more likely to be staff model and group model HMOs; older plans with an enrollment of 50,000 or more; not-for-profit plans; and those owned or sponsored by an AMC. *Acad. Med.* 66(1991):656–661.

There is a growing consensus that current residency programs place too much emphasis on acute, inpatient care, failing to recognize that the majority of services are provided in ambulatory care settings.[2] In recent years, numerous leaders in the field of graduate medical education (GME) have observed that for all the early attention paid to comprehensive medical care, there is a noticeable absence of well-developed educational programs that function in ambulatory care environments.[3-5] And the emphasis on training more primary care physicians has had only a minor impact on the dominant pattern of inpatient-based medical education.[4]

Recent changes in hospitals' case mix, stemming from cost-containment pressures, have diminished the "educational value" of inpatients.[6] The inpatient setting no longer affords residents adequate exposure to certain types of conditions (e.g., cataracts, inguinal hernia) and procedures (e.g., laser and arthroscopic surgery) that are for the most part managed on an outpatient basis; shorter lengths of hospital stay reduce opportunities for residents to learn about the progression of disease and treatment modalities; and increased severity of illness of hospitalized patients affords fewer opportunities for residents to provide preventive, rehabilitative, chronic, and terminal care.[6]

Health maintenance organizations (HMOs) will likely play an integral role in future efforts to place greater emphasis on training in ambulatory settings, because HMOs constitute a growing share of the health care marketplace. In 1970, there were only 37 HMOs in the United States.[7] At the end of 1989, there were 591 HMOs enrolling 34.7 million people, approximately one in seven Americans.[1]

It is increasingly important that methods be found to involve HMOs in GME, not only because HMOs have increased in market share, but also because HMOs represent a distinct type of health care financing and delivery system. Medical practice within an HMO differs from most traditional fee-for-service environments. To be effective and satisfied, physicians must learn a new set of skills, namely those required to function within a complex organization(s) that demands both clinical and financial accountability from its providers within an environment of active peer review.

Some HMOs have been involved in GME for many years. Indeed, during the 1970s, it appeared that an HMO might become an integral part of most academic medical centers (AMCs). A survey conducted in 1973 indicated that 15 medical schools had formal affiliations with HMOs and 42 were in the planning or feasibility stage for the development of an HMO or affiliation with an existing HMO.[8] A handful of AMCs started their own HMOs, including George Washington University, Georgetown University, and Washington University.[9-11] Many other AMCs developed formal affiliation agreements with existing HMOs that provided for varying levels of AMC involvement in HMO governance and management; examples include Rutgers Medical School (now Robert Wood Johnson Medical School) and Rutgers Community Health Plan, and Harvard Medical School and Harvard Community Health Plan.[12,13]

In establishing collaborative GME arrangements, the objectives of AMCs and HMOs are quite different, and not entirely complementary. An AMC's objectives relate primarily to its mission as a teaching institution, and include finding an appropriate patient mix for teaching purposes; exposing students to clinical settings that emphasize prevention and primary care and the efficient delivery of services; enhancing manpower and resources to support education; and exposing students to generalist physicians as role models.[14] An HMO's objectives relate to its primary mission of providing appropriate and affordable patient care through (1) the recruitment and retention of adequate numbers of physicians and of physicians experienced in prepaid, organized delivery systems; and (2) the enhancement of the HMO's public

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image as a quality organization.[14] AMCs assume that affiliation with an HMO will bring increased use of the university hospital and subspecialists; but such arrangements have been financially devastating for some HMOs, because their viability necessitates judicious use of services through the careful selection and monitoring of providers.[10,11] Inherent differences between AMC physicians, who are primarily subspecialists and research-oriented, and HMO physicians, who are more likely to be primary care physicians and practice-oriented, have also led to conflicts concerning faculty appointments, promotions, remuneration, and responsibilities.[10]

For these and other reasons, it has become increasingly apparent that very close relationships between AMCs and HMOs may be untenable. Of the six HMOs founded by AMCs during the late 1960s, only two survive in their original forms and are actively involved in teaching.[14] It is clear that if HMOs are to play a major role in GME, it will be necessary to identify "models" for affiliation or involvement that recognize and balance the differing objectives and constraints of AMCs and/or major teaching hospitals and HMOs.

As a first step in this process of identifying models for HMO involvement in GME, the authors under the auspices of the Medical Directors Division of the Group Health Association of America (the largest and oldest trade association representing HMOs) conducted a survey to ascertain the extent to which HMOs are currently involved in GME; the characteristics of those HMOs most likely to be involved in GME; the kinds of relationships that have developed between HMOs and AMCs and/or teaching hospitals; and the volume of residents receiving training in HMOs by specialty and postgraduate year.

Method

The survey questionnaire was sent to 481 of the 591 prepaid health plans in the United States that have been operational since 1986. Plans less than four years old were excluded because it was felt it would be unrealistic to expect very young plans to be involved in GME. Questionnaires, which were addressed to the plans' medical directors, were first sent in May 1990, and a second request was sent in July 1990. Of the 481 plans that received the questionnaire, 281, or 58%, responded.

Approximately half of the responding plans had enrollments of 50,000 or more, and over 45% of the responding plans were eight years old or older. Of the 281 respondents, 48 (17%) were staff models, 43 (15%) were group models, 48 (17%) were networks, and 142 (51%) were independent practice associations (IPAs). (Group model HMOs are organized, prepaid health care systems that contract with one independent group practice to provide health care services; staff model systems deliver health care services through a salaried group that is employed by the HMO; network model plans contract with two or more independent group practices; and IPAs contract directly with physicians in independent practice, with one or more associations of physicians in independent practice, and/or with one or more multispecialty group practices, although the plan is predominantly organized around single solo-specialty practices.)[15]

In type of plan, the respondents were reasonably representative of the sample as a whole. The response rate was somewhat higher for group (77%) and network (70%) models of HMOs than for staff (57%) and IPA (52%) models. Response rates were also higher for larger plans with enrollments of 50,000 or more; for more mature plans, especially those in the eight-to-15-year age group; and for not-for-profit plans.

Compared with the industry as a whole, the survey respondents may somewhat overstate GME involvement. As is discussed soon, some of these characteristics associated with higher response rates are also characteristics associated with a greater likelihood of a plan's being involved in GME.

Results

The questionnaire requested information about direct and indirect involvement in GME. Plans with direct involvement fall into one of two categories:

- The HMO (or a hospital owned or operated by the HMO) has been approved by the Accreditation Council for Graduate Medical Education (ACGME) to serve as a sponsoring organization of a graduate medical education program.
- The HMO (or a group practice with which it contracts) has a formal agreement with an AMC or teaching hospital to serve as an ambulatory care rotation site.

The results indicated that indirect involvement in GME took many forms, including (1) HMO physicians' involvement in teaching residents at AMCs or teaching hospitals, either on the HMO's time or their own time; and (2) the HMO's being a part of a larger health system that is formally involved in GME.

Fifteen percent of the respondents (42 HMOs) were directly involved in graduate medical education. Seven respondents (2%) indicated that their HMO (or a hospital owned or operated by their HMO) had been approved by the ACGME to serve as a sponsoring organization of a GME program. Thirty-eight (14%) said that their HMO had an agreement to serve as an ambulatory care rotation site with an AMC or teaching hospital that was not owned or operated by the HMO. Three respondents indicated that their HMO had both arrangements.

Table 1 provides descriptive information about the 42 HMOs that in 1990 were directly involved in GME. Staff model and group model HMOs were far more likely to have direct, formal GME arrangements than were network or IPA models. Thirty-three percent of the staff models and 37% of the group models responding to the survey had a formal GME arrangement, compared with 8% of the network models and 4% of the IPA

Table 1

Distinguishing Characteristics of 42 Health Maintenance Organizations (HMOs) Directly Involved in Graduate Medical Education (GME) in 1990*

Characteristic	HMOs Directly Involved in GME (n = 42) No. of HMOs	 % of Respondents	 % of Respondents Involved in GME	Respondents (n = 281)
Model type				
Staff	16	33	38	48
Group	16	37	38	43
Network	4	8	10	48
IPA	6	4	14	142
Total	42	15	100	281
Enrollment				
0-19,999	8	14	19	56
20,000-49,999	7	8	17	86
50,000-99,999	12	20	29	61
100,000 or more	15	19	36	78
Total	42	15	101†	281
Plan age				
4-7 years	12	8	29	152
8-15 years	13	15	31	89
16 years or more	17	43	40	40
Total	42	15	100	281
Location (region)				
New England	3	15	7	20
Mid-Atlantic	6	15	14	40
South Atlantic	5	12	12	43
East Central	9	15	21	60
West Central	3	7	7	44
Mountain/Pacific	16	22	38	74
Total	42	15	99†	281
Tax status				
For-profit	10	6	24	167
Not-for-profit	32	28	76	114
Total	42	15	100	281
Owned or sponsored by an academic medical center				
Yes	7	35	17	20
No	35	13	83	261
Total	42	15	100	281

*To ascertain the extent to which HMOs are involved in graduate medical education (GME), the authors surveyed the 481 prepaid health plans in the United States that had been in operation four years or more; 281 responded. This table compares characteristics of plans with direct involvement in GME with characteristics of all the respondents.

†Does not equal 100% because of rounding.

models. A greater proportion of large plans with enrollments of 50,000 or more were directly involved in GME than were smaller plans. The likelihood of involvement also increased with plan age. Twenty-eight percent of the not-for-profit plans were directly involved in GME, compared with only 6% of the for-profit plans. As would be expected, HMOs owned or sponsored by an AMC were far more likely to be directly involved in GME than those not owned or sponsored by an AMC.

From the column in Table 1 that is next to the right column, it is also possible to glean information about the characteristics of those prepaid health care environments in which residents were most likely to receive training. Of those HMOs directly involved in GME in 1990, about 76% were staff or group models; 65% had more than 50,000 enrollees; 71% were eight years old or older; a disproportionate number were located in the Mountain/Pacific region (includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming); more than three-fourths were not-for-profit; and less than one out of five was owned or sponsored by an AMC.

The 42 plans that indicated they were directly involved in GME were asked to provide specific information concerning the number of residents receiving ambulatory care training, categorized by postgraduate year. As shown in Table 2, a total of 934 residents received some ambulatory training during fiscal year 1990 in one of the 24 HMOs responding to this question. The majority of these residents were in their first, second, or third year of training. The average number of residents (across all years of training) per HMO was 39, but this varied across HMOs from one resident to 312 residents, with the majority of the 24 respondents indicating that they served as an ambulatory care rotation site for 20 or fewer residents.

HMOs directly involved in GME were also asked to provide information on the number of their residents by area of specialization. In general, more HMOs were involved in family medicine and general internal medicine residency training than in other specialties, although HMO involvement was widespread across a number of specialties. Fifty-four percent of the 41 HMOs responding to this question serve as ambulatory care rotation sites for family medicine residents; 56% for general internal medicine residents; 44% for pediatrics idents; 44% for surgery residents; 34% for obstetrics/gynecology residents; and 34% for residents in a variety of other medical specialty areas.

For the most part, HMO ambulatory care training took place in multispecialty, group practice settings consisting of four or more physicians (see Table 3). Thirty-one percent of the 42 HMOs indicated that ambulatory care training took place in very large group practice settings of more than 50 physicians. Eighty-eight percent of the 42 HMOs indicated that residents were supervised in the ambulatory care settings; the remaining five HMOs either did not respond to this question or indicated that they did not know whether supervision was provided. Faculty generally received partial or full compensation from the HMO for their time devoted to supervision.

Plans with direct involvement also were asked to rate various benefits to the HMO. Three-fourths of the respondents felt that GME contributed either some or greatly to enhanced patient care. Over 85 percent indicated that GME contributed to the ongoing education of the HMO's participating physicians. Four-fifths of the respondents perceived benefits in terms of physician recruitment and the enhanced image of the HMO within the community. Other benefits reported included fostering a positive relationship with area hospitals, consultants, community physicians, and medical schools; and the orientation of new physicians to the concept of managed care.

When asked to indicate the rate of retention of residents by the HMO upon completion of their graduate training, 36% of plans either did not respond to this question or indicated that their involvement in GME was too recent for them to know whether residents would be retained after completion of their training. Thirty-six percent of the respondents reported a retention rate between 1% and 20% of residents, 2% reported between 21–40%, 10% reported between 41% and 60%, and 7% reported more than 60% retention of residents.

Table 2

Characteristics of Residents, by Postgraduate Year, Who Received Some Training at Health Maintenance Organizations (HMOs) during 1990*

Year of Training	No. of HMOs	No. of Residents	% of Residents	Residents per HMO: Mean	Median	Range
First	14	246	26	18	6	1–90
Second	16	258	28	16	5	1–91
Third	17	227	24	13	4	1–66
Fourth	8	118	13	15	3	1–46
Fellows	9	85	9	9	4	1–31
All years	24	934	100	39	5	1–312

*To ascertain the extent to which HMOs are involved in graduate medical education (GME), the authors surveyed the 481 prepaid health plans in the United States that had been in operation four years or more; 281 responded. Of these 281 respondents, 42 reported some form of GME involvement. These 42 plans were asked to indicate the number of full-time equivalent residents and fellows on-site at the HMO on a given day between July 1989 and June 1990, but only 24 were able to provide this detailed information. The table presents data about these 24 plans.

Table 3

Numbers and Percentages of Health Maintenance Organizations (HMOs) Involved in Graduate Medical Education (GME), by Site Characteristics

Site Characteristic	HMOs Involved in GME: No.	%
Office setting		
Small office (3 or fewer physicians)	2	5
Group practice of 4 to 25 physicians	16	38
Group practice of 26 to 50 physicians	7	17
Group practice of >50 physicians	13	31
No response	4	10
Total	42	101†
Specialty		
Single specialty	11	26
Multispecialty	27	64
No response	4	10
Total	42	100
Residents' supervision		
Supervised in ambulatory setting	37	88
Not supervised in ambulatory setting	0	0
No response	5	12
Total	42	100
Payment of faculty supervisors		
Fully paid by HMO	19	45
Partially paid by HMO	6	14
Not paid by HMO	12	29
No response	5	12
Total	42	100

*To ascertain the extent to which HMOs are involved in graduate medical education (GME), the authors surveyed the 481 prepaid health plans in the United States that had been in operation four years or more; 281 responded. The 42 plans that reported direct GME involvement were asked to provide descriptive information; some of this information is presented in this table.

†Does not equal 100% because of rounding.

Ten percent said their retention rate was zero.

Plans not directly involved in GME (239 of the 281 plans responding to the survey) were asked to provide information on any "indirect" involvement they may have had in GME. Fourteen percent of the plans not directly involved in GME indicated that HMO physicians taught at an academic medical center or teaching hospital on HMO time; 62% had physicians who taught on their own time; and 9% were part of a larger health system involved in graduate medical education.

Discussion

These findings make apparent that prepaid health care plans are woven into the fabric of GME through a multitude of arrangements. Direct involvement in GME is no longer the exclusive purview of a limited number of HMOs closely linked to AMCs. HMOs owned or sponsored by an AMC are more likely than other HMOs to be directly involved in GME (in 1990, just over one in three participated in GME). But HMOs that are owned or sponsored by an AMC constituted only about 15–20% of all HMOs directly involved in GME.

Although many more HMOs "of all stripes" have become involved in GME during the last two decades, HMOs' impact on GME is still quite limited. The survey results indicate that about 15% of HMOs four years or older are directly involved in GME, and, on average, each of these HMOs provides some training for about 39 residents in any given fiscal year. Assuming the results of the survey are generalizable to all HMOs, this would imply that no more than 2,800 residents receive training in an HMO environment in any given fiscal year. This is but a fraction of the estimated over 36,000 residents in a given year enrolled in a residency program in family practice, internal medicine, obstetrics/gynecology, or pediatrics.[16]

If a sizable proportion of residents are to receive experience in ambulatory care settings that provide all or a significant proportion of services to HMO enrollees, it will be necessary to find ways to increase the number of HMOs directly involved in GME.

Certain HMO characteristics are associated with a greater likelihood of involvement in GME. HMOs directly involved in GME are more likely to be staff and group model HMOs, rather than IPAs. One possible explanation for this finding is that the organizational structure of some IPAs may not be conducive to the more formal, direct types of involvement that were the primary focus of this survey. IPAs contract with individual physicians or with groups of physicians that may or may not practice as a group. In general, the participating physician network for an IPA is more decentralized; primary care services are provided in many different office or clinic settings; and participating physicians derive practice income from a variety of sources in addition to the HMO. An IPA may or may not be aware of its participating physicians' involvement in GME, which is less likely to be indicative of an HMO policy and more likely to reflect individual physicians' preferences and relationships to the broader medical community.

Lower levels of direct involvement on the part of IPAs may also be attributable to the fact that IPAs are on the average younger and smaller than group and/or staff models, and the likelihood of an HMO's getting involved in GME increases with its age and enrollment size. In 1990, a survey[15] of HMOs at least three years old found the average age of IPAs to be 6.6 years, as compared with 17.4 years for staff models and 13.5 years for group models. The median enrollment for these IPAs was 25,732, compared with 43,137 for staff models and 55,337 for group models. Presumably larger, mature HMOs are more financially stable, and probably also in a better position to provide residents with greater breadth and depth of clinical experience.

With regard to the various types of GME arrangements, it is apparent that only a minority of HMOs have sought or are eligible to receive accreditation by the ACGME to serve as a sponsoring organization for a GME program. The very few HMOs that do sponsor GME programs tend to be larger and older HMOs, and, as would be expected, ones that own their own hospitals.

Perhaps the greatest opportunity for increasing HMO involvement in GME rests with the development of more affiliation agreements between HMOs and AMCs and/or teaching hospitals. As discussed above, successful affiliation agreements require that HMOs and AMCs and/or teaching hospitals have a clear understanding of each other's missions and objectives, and of the benefits and costs each party is likely to derive from involvement in GME.

It will also be necessary to overcome other barriers to increased training in all ambulatory care settings, most notably, the lack of adequate financial support.[4] The introduction of residents to an ambulatory care setting increases operating costs and decreases productivity, especially if the residents are in the first or second year of training.[4,17] At present, the major part of the support for graduate medical education is tied to hospital inpatient revenues, and effective methods of channeling the flow of these or other funds to support ambulatory-based education have yet to be found. National medical education leaders have also expressed concern about the need to assure the integrity of ambulatory educational experiences through the recruitment of qualified faculty for ambulatory care sites, the delineation of learning objectives for ambulatory care settings, and the establishment of communication mechanisms between faculty at academic medical centers and faculty and residents at ambulatory care sites.[18]

The authors thank Jack Resnick, M.D., for encouraging the Medical Directors Division to focus its efforts on graduate medical education. Marsha Gold, Sc.D., Joyce Kelly, Ph.D., and Irma Arispe, Ph.D., provided valuable comments and helpful suggestions on both the questionnaire and earlier drafts of this document. We are also grateful to Drs. Howard Kirz, Bruce Sams, Gordon Moore, and other

members of the Medical Directors Division who provided comments on the questionnaire.

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ROGER A. ROSENBLATT, M.D., M.P.H.

The Potential of the Academic Medical Center to Shape Policy-oriented Rural Health Research

Abstract—Rural communities continue to have problems in gaining access to basic health care services, a problem exacerbated by persistent shortages of physicians, financially threatened rural hospitals, and weak local economies. Academic health centers can help to address these issues, not only by increasing the flow of their graduates to rural areas, but also by supporting health services research designed to shape public policy that affects the rural United States. Examples of such research include experiments designed to influence the locational decisions of medical students and residents, studies of the quality and cost-effectiveness of care in rural hospitals, and the testing of new ways to provide emergency medical care in rural areas. Such policy-oriented research is compatible with both the intellectual and the service missions of most medical schools; in addition, lessons learned in rural areas may be relevant in more urbanized areas. *Acad. Med.* 66(1991):662-667.

There is a tension between the central mission of America's academic health centers and this nation's need to develop stable health care systems in rural parts of the country. Academic health centers are for the most part urban institutions, dependent on their cosmopolitan settings for their flows of patients, money, and ideas. The clinical care and research performed in our medical schools is highly specialized, and the graduates of our teaching institutions tend to follow in the footsteps of their mentors and role models. Relatively few of the graduates of these schools diffuse to rural communities, where the need for practitioners is acute.

This persistent inability of our medical schools to meet rural health care systems' needs for medical personnel serves neither partner well. Rural health care systems are in crisis, and our medical schools are neglecting an element of medical care service, teaching, and research that has great relevance for all academic medical centers, no matter where they are situated or what their missions. A large portion of medical care in this country consists of primary care encounters between physicians and patients; and a substantial amount of the medical endeavor—both primary care and secondary and tertiary care—takes place in areas that are rural. As the major source of trained medical practitioners, we in academic medicine should be interested both in producing pertinent knowledge that future practitioners can use in the field and in making sure that we equip our graduates with this knowledge when they emerge from institutions into a world that has many hues and many venues.

The objective of this article is to convey a sense of the relevance and challenge of policy-oriented research in rural health care, the pertinence of this research to the central mission of the academic health center, and the opportunities that exist to obtain substantial support for incorporating this policy-oriented research thrust within our broader scholarly agenda. As the nation has belatedly focused on the necessity for improving access to care within the constraints of limited resources, it has become increasingly important to increase our understanding of the natural history of commonly encountered diseases. In addition, it has become equally important to enhance our ability to respond efficiently to the patients with those diseases and to create a delivery system that ensures that the entire population can benefit from those interventions. Rural health research designed to shape public policy is an excellent example of an activity that ties many of these themes together. (For an overview of the different areas of such research, see the list later in this article in the section entitled "Promising Research Areas.")

Rationale for a Rural Focus

What is the rationale for singling out rural health as a separate area of inquiry, particularly in a technologically advanced country such as the United States? Certainly the basic biological verities apply with the same force in rural as in urban areas. With a few notable exceptions, differences in disease prevalence do not justify designating rural health care a separate area or endeavor.

The major reason that it is worthwhile to focus our intellectual microscopes on rural America as a separate subject of study is that there are differences in the way health services are delivered in rural areas. The differences are the direct consequences of the topographic and demographic features by which we define "rural." A useful if imprecise definition is that rural areas are those places with relatively low population densities that are relatively isolated from major metropolitan centers. The two variables by which we define a place as urban or rural—population density and distance from population centers—are both continuous variables, and the ultimate designation is as much a cultural as a scientific decision.

Even though the concept of rural may be relativistic, it is possible and

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This article, in a slightly different form, was presented as a talk at the AAMC Plenary Session on Rural Health Research at the association's annual meeting in San Francisco, October 23, 1990.

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Another article about rural health care appears on page 682.

necessary to develop mechanisms to identify which populations will be categorized as rural for the purposes of research. The federal government has developed two similar but not identical approaches for the definition of rural populations, one of the sources of confusion about the statistics. The Census Bureau defines the rural population as that part of the population not living in urban areas —a novel and creative approach! Urban areas are defined as central cities and their suburbs and surrounding towns with at least 2,500 people. About 25% of the U.S. population is rural by this definition. The major problem with this definition is that a town of 2,600 people is considered urban, which violates our intuitive sense of the difference between urban and rural communities.

The more commonly used—and the more useful—definition is not promulgated by the Census Bureau but by the Office of Management and Budget. In this definition, the country is divided into metropolitan statistical areas (MSAs) and non-MSAs. The definition of an MSA is a county or group of counties with a city of 50,000 or more residents (similar to the Census Bureau's definition of an urbanized area) or an urbanized area with at least 50,000 people that is part of a county or group of counties with at least 100,000 people. Although this tongue twister of a definition is a bit convoluted, many of the data describing rural areas in standard texts and papers are really data about non-MSAs. Even though most of the land mass of the United States is rural, most of the population lives in urban areas, and urbanization has been one of the most powerful demographic trends in this country since the turn of the century.

Yet the fact that the population is mostly urban does not mean that the number of people living in rural settings is insignificant. As can be seen in Figure 1, the total rural population has actually remained the same or increased slightly as the United States has grown. About 50 million people live in nonmetropolitan areas. The farm population has shrunk radically, but the number of rural Americans remains substantial.

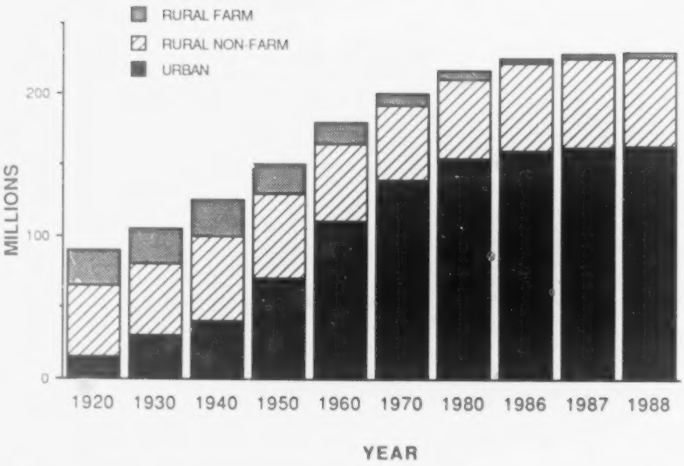

Figure 1. **U.S. rural and rural farm populations, selected years, 1920–1988.**

Despite the difficulty of crisply defining rural, the contrast between urban and America is not merely a theoretical construct in the mind of geographers. It has intensely practical implications. The five most urban states have less than 10% of their populations in rural areas; the five most rural states have more than 70% of their populations in rural areas.

When translated into population density, the contrast is striking. As seen in Figure 2, the most densely populated state—Rhode Island—has almost 200 times the number of people per square mile as does the most rural state, Wyoming. But even Rhode Island has pockets of rural communities, and some of these communities have difficulty obtaining ready access to local health care services. Moreover, even among the most rural states there are enormous disparities, with Vermont, for example, having a large proportion of people spread evenly across the landscape without the enormous distances that characterize the western states.

Rural Health Care Delivery

What are the consequences of low population density and isolation for the delivery of health services? From a conceptual standpoint, it is critical to recognize that the effects of rurality on health care services are merely a special case of the effects of rurality on the production and distribution of all other goods and services in sparsely populated areas. The two major ways by which we define a rural area each describe situations that exact additional burdens and costs in the production of goods and services. Isolation makes it more difficult to attract people with special skills and talents to rural areas, increases the cost of accruing raw materials, and adds its own tariff in the distribution of products. Low population density is a direct cause of relative diseconomies of scale, in which the unit cost of producing any item tends to be higher because optimal efficiencies cannot be achieved. This applies with equal validity to the production of widgets for use in automobile manufacture, to the maintenance of schools or highways, and to the establishment of a health care system.

The recent rebirth of interest in rural America in general, and rural health in particular, is a consequence of a precipitous decline in the economic and demographic fortunes of rural areas during the 1980s. This decline was the more dramatic because

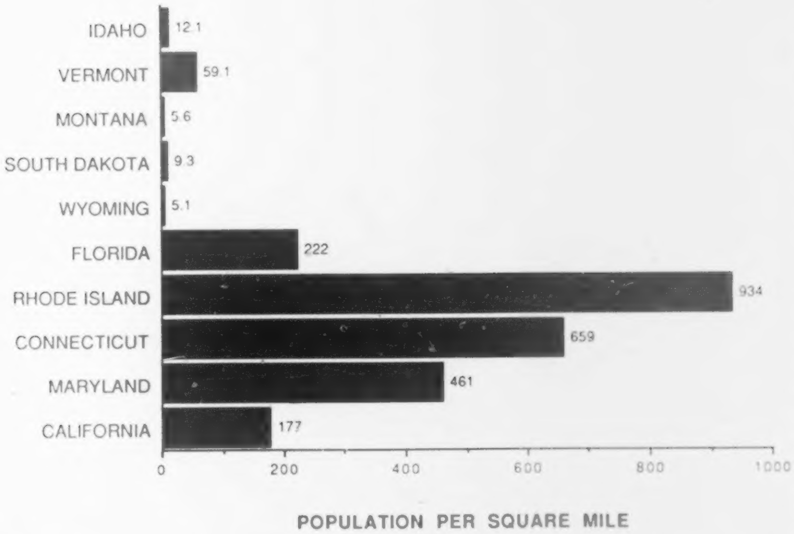

***Figure 2.* Population densities of the five most rural and five most urban states.**

the previous decade had been characterized by a brief rural renaissance, in which there was a substantial migration of people and economic opportunities to rural areas. Unfortunately, the 1970s proved to be the exception to the more general trend, and the laissez-faire economic policies of the Reagan years contributed to a situation where rural population growth, employment rates, and income lagged far behind that of urban areas. These doldrums were caused by the same structural factors that led to deterioration of the status of health services in rural areas.

The persistent economic instability of rural America has made it difficult to preserve — much less create — viable health care systems and stable retinues of health care providers. One of the main problems is that there is a fundamental tension between the relative economic simplicity of individual rural communities and the increasingly intensive technological nature of the medical endeavor. Rural economies are largely extractive. In the West, for example, they tend to be based on such industries as lumber, agriculture, mining, and cattle — commodities that come from the land. Although each of these industries has experienced a significant increase in technological sophistication over recent years, the end products today differ little from their predecessors decades ago.

Medicine, by contrast, has changed radically. The capital intensity of hospitals and physicians' offices has accelerated in recent years, driven by new capabilities, expanding patient expectations, and competition within the industry based more on product line than on price. These differences in the characteristics of basic rural economics and the technological sophistication of the medical enterprise have collided, with many rural towns unable to support the entry costs of maintaining a modern medical system.

Promising Research Areas

There are many ways in which one can organize an approach to the exploration of rural health issues, each of which has some intuitive or theoretical appeal. However, from a purely pragmatic standpoint, it makes sense to refer to a format (in the list soon to follow) that has been adopted by the Agency for Health Care Policy and Research (AHCPR), the federal agency that supports many of the research endeavors in rural health issues.

In December 1987, the federal government sponsored a conference in San Diego that was convened by the National Rural Health Association and the Foundation for Health Services Research. The purpose of the conference was ". . . to identify gaps in the knowledge base of rural health service issues, and develop a rural health services research agenda that could . . . provide guidance to federal policymakers."[1]

The following nine areas for rural health research represent an expanded version of the roster developed at this conference. Although this list is not sacrosanct and the author's explanations of the areas are broad ones only, it is a useful list and has considerable appeal.

Health personnel and primary care. Studies in this area involve the training, deployment, and support of health personnel for rural areas, with special attention to the roles and functions of different health professionals and the adequacies of supplies in different areas.

Rural emergency medical services. Studies in this area involve optimal responses to emergent and life-threatening accidents and illnesses in rural areas, with a focus on the prehospital and institutional capabilities that can be sustained in sparsely populated areas.

Rural hospital structure and function. This research area involves an exploration of the role and function of rural hospitals, including attention to issues of scope of services, quality, organizational efficiency, governance, cost, appropriateness, and reimbursement.

Maternal and child care. Studies in this area concern the provision of basic obstetric, neonatal, and pediatric services in rural areas, with special attention to the prevention of disease and the design of regionalized perinatal care systems for the care of very small or very sick newborns.

Rural poor and uninsured. This re-

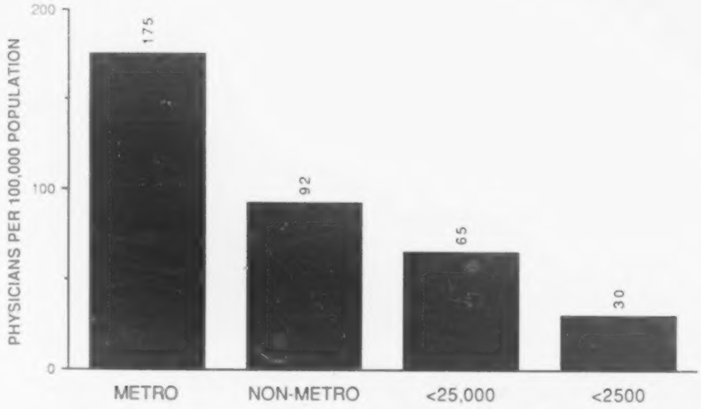

Figure 3. **Physician supply by rural and urban location, United States, 1988.**

search area involves the study of insurance and reimbursement systems that address the disproportionately large number of rural dwellers who live in poverty and lack health insurance, with an emphasis on developing and evaluating innovative approaches to these persistent structural problems.

Rural elderly and long-term care. Studies in this area concern geriatric care in rural populations in the ambulatory, hospital, and long-term care settings.

Mental health services. This area of research explores the epidemiology of mental illness in rural communities and the provision of basic mental health services by a variety of professionals and paraprofessionals.

Racial and ethnic minorities. This area would include studies of specific racial and ethnic groups—such as Native Americans and Hispanic migrant workers—whose members are found in specific rural areas and have specific health problems compounded by difficulty in gaining access to health care services.

"Alternative" delivery systems. This area of research would focus on the design, testing, and evaluation of new organizational forms for the delivery of health services, including attempts to modify health maintenance organizations in their various forms to be effective in rural environments.

Although it is impossible to delve into all nine areas in depth, it is worthwhile to discuss some of the issues that are inherent in the top three. This will illustrate some of the richness of potential policy-relevant research that can be done in the area of rural health and some of the ways these issues can be approached.

Health Personnel and Primary Care

The first area, health personnel and primary care, is probably the one most closely related to the educational activities of academic health centers.

The shortage of health manpower is the persistent Achilles heel of rural health, not only in the United States in this era, but in all countries as far back as one looks. Trying to understand and address the relative shortage of health personnel in rural areas is a fertile area for further research. Such efforts might include creating and rigorously studying carefully constructed educational interventions within medical schools, designed to increase the proportion of students who would establish their practices in rural areas.

The statistics are stark (see Figure 3). There is a linear relationship between population density and the relative supply of physicians. The more rural the area, the fewer physicians are available.

A major source of this discrepancy in physician supply has to do with the relationship between the type of specialty choice and practice location. That is, general and family physicians distribute themselves in proportion to the overall population, while the further one's specialty is from primary care, the more likely one is to locate in a major urban area. The reasons for this involve the technological and capital intensity of specialized medical endeavors, the propensity of physicians to remain tethered to the institutions where they trained, the relative wealth of the urban areas, and the much more familiar urban cultural milieu. The problems have been with us a long time; the answers remain elusive and deserve more investigation.

For example, we know that is possible to influence the specialty choices of graduating medical students and the locational decisions of graduating residents through educational and reimbursement policies. A number of medical schools throughout the country have focused on this approach, some with more than modest success. Yet it isn't a simple process, and it usually isn't a concern central to the leaders of most of our academic health centers. The major question for the academic medical centers is whether this issue is one that medical schools will place high enough on their priority lists to address meaningfully or whether they will leave it to state and federal entities to cajole, bribe, or threaten them into making this a central element of the educational service mission. Research can be useful in increasing our understanding of how academic medical centers can effectively address the issue of influencing specialty and practice location choices, and can be encouraged if the medical centers provide traditional academic rewards to investigators who pursue such research.

Emergency Medical Services

The second major topic for research is that of emergency medical services (EMS). The sine qua non of the rural medical care system is its ability to provide emergency services. Rural residents will fight tenaciously to preserve their local hospitals, even though many of those residents will bypass the facility for routine care. Their major motive is to maintain the capability of the system to respond to emergencies.

The statistics underline the logic of this attitude. Many of the industries common in rural areas are associated with high injury and death rates, including farming, mining, and forestry. Despite the high rates of occupationally related injuries, rural areas are handicapped in their ability to deal with these injuries. The essential definition of an emergency is that the condition of the victim deteriorates rapidly with time. The success of the medical intervention is directly related to the speed with which the victim receives appropriate care, but delays are inevitable in sparsely populated areas. This combination of increased rates of injury and less effective systems can be seen in the relative death rates from auto accidents, which are much higher in rural areas.

Despite this need for improved EMS systems, the rural EMS system capability has actually deteriorated with the waning of federal and state funding for local services. This is reflected in the extent to which states —particularly rural states—fail to meet the criteria established for regional trauma systems. According to data from the American College of Surgeons, only two states have all eight components of a regional trauma system, and the majority of states have *none* of the components.

This is an area where the academic medical centers can provide substantial leadership. Most of them are involved in running sophisticated urban trauma centers, often as part of a system of public hospitals. It would seem a logical extension of their role to become more involved in designing and implementing rational, regionalized emergency medical care systems. Part of the responsibility is not only to wait passively for those patients who appear in emergency departments, but to help the remote hospitals and physicians build the capability to appropriately resuscitate, stabilize, and transport those patients who will ultimately benefit from our tertiary capabilities. Specific research projects could focus on the quality of care rendered in different settings, the identification of types of avoidable mortality, the testing of new means of stabilization and transport, and changes in the training and deployment of EMS personnel.

Rural Hospitals

The third major area is the rural hospital. It has probably been the distress of rural hospitals following the enactment of legislation mandating prospective payment and diagnosis-related groups (DRGs) that has most galvanized political attention to rural health care. There are good reasons for this. Not only is the rural hospital one of the most important economic institutions in many small towns, but until recently the rural hospital was a prerequisite for creating any kind of stable rural health care system.

The rural hospital over the last decade has been a beleaguered institution. Twenty years ago rural hospital acted like miniature versions of urban hospitals, with the major distinction being smaller volumes. This is no longer true. The rural hospital in today's technologically intense world must define a unique role for itself, a core set of basic services that it can offer to meet the basic needs of the rural populations it serves. It must also acknowledge that there are a number of very technologically intense services that it would be better not to try to incorporate into its repertoire. The experience of the University of Washington with the Kellogg WAMI Rural Hospital Project and with the Area Health Education Center's Community Health Service Development Project reinforces a conviction that it is possible to define such a role.

But the rural hospital has faced another set of problems that derive from the tenuous financial stability of these institutions. The passage of the Medicare Prospective Payment Laws in 1983 totally changed the rules of the game and plunged rural hospitals nationwide into a sea of red ink. Small rural hospitals as a class went into collective bankruptcy. Although urban hospitals saw their profit margins pared, they remained solvent, while many rural hospitals were no longer financially viable.

Not surprisingly, these vulnerable institutions have not all survived this financial stress. The extent of the problem can be appreciated by looking at the pattern of rural hospital closings over recent years. Two hundred ninety-eight rural hospitals closed their doors between 1980 and 1989, and no part of the country was untouched. Ten percent of all rural hospitals in the United States closed within the past decade, and the rate of closure continues to accelerate. A key public policy objective should be to sustain appropriate rural hospitals as part of rationally designed rural health care systems. Hospitals should be saved not simply for their own sakes, but because they anchor all the bits and pieces of a health care system that mean adequate and appropriate care for rural communities: doctors, ambulances, emergency rooms, diagnostic facilities, and often nursing homes. The rural hospital needs to go through a logical transformation so that it fits within a modern medical system, but it shouldn't be eradicated. To accomplish this transformation, research will be needed into the organization and functioning of rural hospitals, with special attention to the quality and cost-effectiveness of specific types of care.

This is another area in which the academic medical center can provide leadership. Although most tertiary teaching hospitals are remote from the small rural hospitals that are in distress, there are linkages through patient referral, the diffusion of medical school and residency graduates, and ties through professional associations. Much of the expertise within the academic health center is relevant to rationalizing the operations of smaller facilities, and cooperation between teaching hospitals and a network of rural hospitals can be mutually beneficial. Academic medical centers already see themselves as regional resources for clinical care and medical education; extending the definition to include the sustenance of rural health care systems is a logical extension of their already important regional roles.

Conclusion

There are a number of reasons that the area of rural health care research is a very exciting area of inquiry for faculty in academic health centers. First, it is intellectually stimulating. Rural settings are microcosms of the larger world, with the problems of sparse population and isolation thrown in. Trying to design rational and efficient systems of care and understanding the interaction between human populations and the environments in which they live bring up some of the most important problems that confront not only our health care system but society in general.

Second, research in this area can make a difference. Rural settings, for all their complexity, are often much simpler than their urban counterparts, which have interwoven and sometimes immovable characteristics. At the University of Washington we have had the experience repeatedly over the last two decades of seeing research translated into public policy. Sometimes the translations have had only a tangential relationship to the original work, but at least we're working in a field where people are paying attention and where palpable changes can be made in relatively short time frames. Descriptions of the university's experiences in this area are beyond the scope of this paper, but the author will be glad to provide such descriptions to interested readers.

Last, the answers that are extracted from rural health care research can often be extrapolated to urban populations in this country and to other countries with different health care systems. The problem of designing appropriate and cost-effective health care systems within set resource constraints is not, after all, primarily a rural problem. I would suggest that we embrace the rural parts of our service areas as laboratories in which to try new experiments in medical education, health services delivery, and community involvement. Not only will we improve the quality of life in the regions which we serve, but we may learn things that we can bring back and apply in our home institutions.

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ORIGINAL CONTRIBUTIONS

ARTICLES

Where Physicians Practicing in Appalachia in 1978 to 1990 Were Trained and How They Were Distributed in Urban and Rural Appalachia

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Abstract—Medical school graduates who graduated from 1978 to 1986 were analyzed to determine the health professions' ability worldwide to educate and place primary care physicians in rural areas of Appalachia. These data indicate that the University System of West Virginia—consisting of the West Virginia School of Osteopathic Medicine, West Virginia University Medical School, and Marshall University Medical School—produced the most primary care physicians who began practicing in rural Appalachia during the 1980s. The West Virginia School of Osteopathic Medicine successfully retained 106 (26%) of its graduates in primary care practices throughout rural Appalachia, with 77 of them in rural West Virginia, making the institution the nation's leading provider of primary care physicians practicing in rural Appalachia and West Virginia during this eight-year study period. With the exception of West Virginia, these and additional data support concerns of medical educators and public health officials that physicians in Appalachia are distributed disproportionately, more to urban than to rural counties. *Acad. Med.* 66(1991):682–686.

The ability of a state to retain its medical school graduates is related to highly complex interactions among the school, the state, and the individual physicians. Training and retention of physicians, particularly of primary care physicians who return to practice in rural and underserved regions of the United States, has proven to be an extremely difficult task for medical educators and public health departments.[1-4]

The rural areas of the United States, especially Appalachia, have pronounced health care problems, with the poor distribution of physicians being one contributing factor.[5] The need for educating, training, and retaining doctors who will serve these people is crucial.

This paper presents available data from 1978 to 1990 concerning (1) the institutions (worldwide) that trained the physicians—especially primary care physicians—who were practicing in Appalachia, and (2) the physicians' distribution in the rural and urban areas of that region.

Defining Appalachia

The Appalachian region has been most consistently defined by the Appalachian Regional Development Act[6]; it includes all of West Virginia and parts of New York, Pennsylvania, Maryland, Virginia, Ohio, Kentucky, Tennessee, North and South Carolina, Georgia, Alabama, and Mississippi. It incorporates 397 counties in the 13 states included in this study.

Sources of Data

Methods developed by the U.S. Bureau of the Census for categorizing counties as metropolitan (urban) or nonmetropolitan (rural) are used throughout this study. Standard Metropolitan Statistical Areas (SMSAs) are areas with one city having a population of at least 50,000, or a city with a population of 25,000 and contiguous regions of at least 1,000 people per square mile and a combined total of 50,000 people.[7]

The American Medical Association (AMA) and the American Osteopathic Association (AOA) have compiled professional and practice-related information on all physicians in the United States. These files are now available for research on physician manpower and health-related matters and were used as primary sources of information for the findings presented in this study. Physician file data are obtained from both AMA and AOA surveys and input from physicians and other organizations and institutions. These data are managed by the Division of Survey and Data Resources of the AMA and the AOA, which are responsible for the ongoing maintenance and updating of individual physicians' records.

Physicians' data are provided to

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Another article about rural health care appears on page 662.

the AMA and AOA divisions of Survey and Data Resources by primary sources, including medical schools, hospitals, medical societies, the National Board of Medical Examiners, state licensing agencies, the Educational Commission of Foreign Medical Graduates, the Surgeon General of the United States, the American Board of Medical Specialties, and physicians' and medical groups. The AMA and AOA physician files use data from primary sources only; information is entered after it is verified by a primary source.

Method

Data were collected in the present study by retrospectively following all graduates of medical schools (worldwide) from the years 1978 to 1986 who began practicing in Appalachia, as listed in AMA (June 1990) and AOA physician files (September 1989). In addition, for cross-checking purposes, data were obtained for all the West Virginia School of Osteopathic Medicine (WVSOM) graduates from 1978 to 1986 through review of the alumni placement files and the physician files of the WVSOM.

The findings reported here are based on responses to requests for the numbers of graduates of individual medical schools who were non-federal physicians and who were practicing in each of the county groups (non-SMSA or SMSA). Those physicians in internships, residencies, and military service were excluded. All active non-federal allopathic (M.D.) and osteopathic (D.O.) physicians in patient care and the specialties of family practice and general practice, internal medicine, pediatrics, and obstetrics and gynecology were defined as primary care physicians. These physicians, as well as those in all other physician practice specialties, were included in the study's analyses of medical school graduates from 1978 to 1986.

Findings

Table 1 shows the numbers of graduates (1978 to 1986) from all medical schools worldwide who had rural and urban primary care practices in Appalachia during the period of this study. The ten schools having the most graduates practicing in rural counties are shown by name, and additional data are presented about their graduates.

The West Virginia School of Osteopathic Medicine, West Virginia University Medical School, and the University of Mississippi Medical School ranked first, second, and third, respectively, in the percentages of their graduates with primary care practices in rural Appalachia. The West Virginia School of Osteopathic Medicine, the University of Alabama School of Medicine, and the West Virginia University Medical School ranked first, second, and third, respectively, in the percentages of all their graduates returning to practice as primary care physicians throughout all of Appalachia (rural and urban).

When actual numbers of primary care physicians returning to rural areas of Appalachia are considered, the West Virginia School of Osteopathic Medicine led all other schools by returning 106 of its graduates. The University of Mississippi School of Medicine, the University of Alabama School of Medicine, and the Medical College of Georgia were next, with 68 graduates each. Data from all schools (worldwide) indicate that the total

Table 1

Numbers and Percentages of Graduates (1978–1986) with Primary Care Practices in Appalachia from the Ten Medical Schools That Produced the Most of Such Graduates*

Schools§	Rural†		Urban‡		Rural and Urban		Total No. Graduates in All Specialties Practicing in United States
	No.	%	No.	%	No.	%	
WV School of Osteopathic Medicine	106	25.4	53	12.7	159	38.1	417
U. Mississippi School of Medicine	68	6.7	30	3.0	98	9.7	1,011
Medical College of Georgia	68	5.5	57	4.6	125	10.1	1,240
U. Alabama School of Medicine	68	6.1	239	21.6	307	27.7	1,107
WV U. School of Medicine	65	10.7	84	13.8	149	24.4	610
Philadelphia College of Osteopathic Medicine	61	6.4	123	12.9	184	19.3	952
U. Tennessee School of Medicine	55	4.8	124	10.9	179	15.7	1,141
U. Kentucky School of Medicine	48	6.4	23	3.1	71	9.5	745
U. Louisville School of Medicine	47	4.6	25	2.4	72	7.0	1,024
U. Thomas Jefferson School of Medicine	47	3.2	83	5.7	130	9.0	1,449
All schools worldwide	**1,665**		**2,997**		**4,662**		**130,855**

*The authors assembled available data to determine which medical schools worldwide were mainly responsible for training and placing physicians — especially those in primary care specialties — in Appalachia. The table lists the ten medical schools that had the most graduates practicing primary care in rural counties from 1978 to 1986.

†"Rural" means a non-Standard Metropolitan Statistical Area.

‡"Urban" means a Standard Metropolitan Statistical Area.

§The schools are listed in descending order of the number of their graduates practicing in Appalachian rural areas.

Table 2

Numbers and Percentages of Graduates (1978–1986) in Any Specialty Practicing in Appalachia from the Ten Medical Schools That Produced the Most of Such Graduates*

School§	Rural†		Urban‡		Rural and Urban		Total No. Graduates in All Specialties Practing in United States
	No.	%	No.	%	No.	%	
WV U. School of Medicine	128	21.0	174	28.5	302	49.5	610
WV School of Osteopathic Medicine	126	30.2	73	17.5	199	47.7	417
Medical College of Georgia	106	8.5	106	8.5	212	17.1	1,240
U. Mississippi School of Medicine	99	9.8	60	5.9	159	15.7	1,011
U. Alabama School of Medicine	97	8.8	433	39.1	530	47.9	1,107
U. Tennessee School of Medicine	91	8.0	242	21.2	333	29.2	1,141
U. Thomas Jefferson School of Medicine	77	5.3	167	11.5	244	16.8	1,449
Philadelphia College of Osteopathic Medicine	72	7.6	159	16.7	231	24.3	952
U. Kentucky School of Medicine	68	9.1	44	5.9	112	15.0	745
U. Louisville School of Medicine	63	6.2	36	3.5	99	9.7	1,024
All schools worldwide	**2,654**		**5,820**		**8,474**		**130,855**

*The authors assembled available data to determine which medical schools worldwide were mainly responsible for training and placing physicians — especially those in primary care specialties — in Appalachia. The table lists the ten medical schools that had the most graduates in any specialty practicing in rural counties from 1978 to 1986.

†"Rural" means a non-Standard Metropolitan Statistical Area.

‡"Urban" means a Standard Metropolitan Statistical Area.

§The schools are listed in descending order of the number of their graduates practicing in Appalachian rural areas.

number of primary care physicians going to urban areas within Appalachia (2,997) was greater than the total number of those practicing in rural Appalachia (1,665).

Table 2 shows the number of all 1978–1986 graduates, no matter what specialty they chose, who were practicing in the rural and urban areas of Appalachia during the time span of this study. Only the ten medical schools having the most graduates practicing in rural counties are shown by name in this table, along with additional data about their graduates. The West Virginia School of Osteopathic Medicine, the West Virginia University School of Medicine, and the University of Mississippi Medical School ranked first, second, and third, respectively, in the percentages of all physicians practicing in rural Appalachia, whereas West Virginia University Medical School, the University of Alabama School of Medicine, and the West Virginia School of Osteopathic Medicine ranked first, second, and third, respectively, when rural and urban counties were combined.

When actual numbers of all physicians returning to rural areas of Appalachia were considered, West Virginia University Medical School, the West Virginia School of Osteopathic Medicine, and the Medical College of Georgia were the top three institutions. Comparison of the numbers of all physicians going to rural as opposed to urban Appalachia indicates that when physicians from all schools (worldwide) are considered, 2,654 went to rural areas and 5,820 to urban sites.

Table 3 shows the numbers of graduates with urban and rural primary care practices in West Virginia only. All of West Virginia is defined as being a part of Appalachia; it is the only state to be so designated by the Appalachian Regional Commission.[6] Only those schools having four or more graduates practicing as primary care physicians in rural counties are shown by name in this table, and additional data are presented about their graduates.

As might be expected, West Virginia's three medical schools supplied the majority of primary care physicians practicing throughout West Virginia, with the West Virginia School of Osteopathic Medicine leading its sister institutions in actual numbers and percentages of graduates with primary care practices in rural counties. When all schools (worldwide) are considered, the total number of all primary care physicians practicing in rural areas (287) was almost two-thirds more than the number in urban sites (175).

Table 4 shows the numbers of all graduates practicing in all specialties in West Virginia. Only those schools having four or more graduates practicing in rural counties are listed by name in this table, and additional data are given about their graduates. The West Virginia School of Osteopathic Medicine, West Virginia University Medical School, and Marshall University Medical School ranked first, second, and third, respectively, in the percentages of physicians practicing in rural West Virginia.

The distribution of the total numbers of physicians to rural or urban regions of West Virginia, shown in Table 4, indicates that approximately one-third more went to rural (460) than to urban (313) areas of the state.

When the population distribution and physician distribution for all Appalachia were compared for this study, it was determined that during

Table 3

Numbers and Percentages of Graduates (1978–1986) with Primary Care Practices in West Virginia, from the 13 Medical Schools That Produced the Most of Such Graduates*

School§	Rural† No.	Rural† %	Urban‡ No.	Urban‡ %	Rural and Urban No.	Rural and Urban %	Total No. Graduates in All Specialties Practicing in United States
WV School of Osteopathic Medicine	77	18.5	36	8.6	113	27.1	417
WV U. School of Medicine	58	9.5	61	10.0	119	19.5	610
Marshall U. School of Medicine¶	19	13.2	22	15.3	41	28.5	144
Medical College of Virginia COMM	7	0.7	0	0.0	7	0.7	1,062
U. Virginia School of Medicine	6	0.7	0	0.0	6	0.7	857
U. Pittsburgh School of Medicine	5	0.6	0	0.0	5	0.6	882
Loyola U. Chicago, Stritch School	5	0.6	0	0.0	5	0.6	894
George Washington U. School of Medicine	4	0.4	1	0.1	5	0.6	893
U. Maryland School of Medicine	4	0.5	0	0.0	4	0.5	881
Penn State U. School of Medicine	4	0.6	0	0.0	4	0.6	634
Temple U. School of Medicine	4	0.3	0	0.0	4	0.3	1,196
Loma Linda U. School of Medicine	4	0.4	0	0.0	4	0.4	893
New York College of Osteopathic Medicine	4	0.3	0	0.0	4	0.3	1,230
All schools worldwide	**287**		**175**		**462**		**130,855**

*The authors assembled available data to determine which medical schools worldwide were mainly responsible for training and placing physicians—especially those in primary care specialties—in Appalachia. The table lists the 13 medical schools that had the most graduates in primary care practicing in rural West Virginia counties from 1978 to 1986.

†"Rural" means a non-Standard Metropolitan Statistical Area.

‡"Urban" means a Standard Metropolitan Statistical Area.

§The schools are listed in descending order of the number of their graduates practicing in West Virginia rural areas.

¶Marshall's first class graduated in 1981.

Table 4

Numbers and Percentage of Graduates (1978–1986) in Any Specialty Practicing in West Virginia from the 16 Medical Schools That Produced the Most of Such Graduates*

School§	Rural† No.	Rural† %	Urban‡ No.	Urban‡ %	Rural and Urban No.	Rural and Urban %	Total No. Graduates in All Specialties Practicing in United States
WV U. School of Medicine	111	18.2	109	17.9	220	36.1	610
WV School of Osteopathic Medicine	90	21.6	46	11.0	136	32.6	417
Marshall U. School of Medicine¶	25	17.4	28	19.4	52	36.8	144
Medical College of Virginia COMM	14	1.3	2	0.2	16	1.5	1,062
U. Maryland School of Medicine	10	0.8	4	0.3	14	1.1	1,230
U. Virginia School of Medicine	9	1.1	0	0.0	9	1.1	857
Hahnemann U. School of Medicine	7	0.6	3	0.2	10	0.8	1,216
U. Pittsburgh School of Medicine	7	0.8	1	0.1	8	0.9	894
Medical College of Pennsylvania	6	0.7	1	0.1	7	0.9	803
U. Autonoma de Guadalajara	6	0.2	3	0.1	9	0.4	2,437
U. Georgetown School of Medicine	5	0.5	2	0.2	7	0.6	1,108
U. North Carolina School of Medicine	4	0.4	0	0.0	4	0.4	1,015
Medical College of Thomas Jefferson	4	0.3	5	0.3	9	0.6	1,449
Temple U. School of Medicine	4	0.3	3	0.3	7	0.6	1,196
Wake Forest (Bowman Gray)	4	0.6	0	0.0	4	0.6	680
Penn State U. School of Medicine	4	0.6	0	0.0	4	0.6	634
All schools worldwide	**460**		**313**		**773**		**130,855**

*The authors assembled available data to determine which medical schools worldwide were mainly responsible for training and placing physicians—especially those in primary care specialties—in Appalachia. The table lists the 16 medical schools that had four or more graduates in any specialty practicing in rural counties from 1978 to 1986.

†"Rural" means a non-Standard Metropolitan Statistical Area.

‡"Urban" means a Standard Metropolitan Statistical Area.

§The schools are listed in descending order of the number of their graduates practicing in rural Appalachian counties.

¶Marshall's first class graduated in 1981.

the time period studied, 49% of the people lived in rural areas, 36% of the primary care physicians practiced in rural areas, and 31% of all physicians, regardless of specialty, practiced in rural areas.

In West Virginia, 65% of the population lived in rural areas, 62% of the primary care physicians practiced in rural areas, and 60% of the physicians, regardless of specialty, practiced in rural areas.

In all of Appalachia except West Virginia, 47% of the population lived in rural areas, 32% of the primary care physicians practiced in rural areas, and 28% of the physicians, regardless of specialty, practiced in rural areas.

The percentage of primary care physicians considered in this study who had begun to practice in rural counties of West Virginia (62% in rural counties) nearly matched the rural population distribution for this state (65% in rural counties). However, the comparable placement of primary care physicians in the rest of Appalachia (32% in rural counties) fell far below the rural population distribution (47% in rural counties).

Summary and Conclusions

Analyses of the health professions' ability to place primary care physicians in rural areas of Appalachia indicate that the University System of West Virginia, consisting of the West Virginia School of Osteopathic Medicine, Marshall University Medical School, and West Virginia University Medical School, was the most successful. Seventeen percent of the graduates (1978 - 1986) of this system provided primary care for rural Appalachia.

The West Virginia School of Osteopathic Medicine successfully retained 106 of its graduates practicing in primary care in rural Appalachia with 77 of them throughout rural West Virginia. These results indicate that during the time period studied, the WVSOM was the nation's leading provider of primary care physicians practicing in rural regions of Appalachia and West Virginia.

The geographic distribution of primary care physicians throughout all of Appalachia indicates that 36% were practicing in rural and 64% in urban areas. When all graduates, including all specialties, are considered, 31% were in rural areas and 69% in urban areas.

The geographic distribution of primary care physicians throughout West Virginia indicates that 62% were practicing in rural areas and 38% in urban areas. When all graduates, including all specialties, are considered, 60% were in rural areas and 40% in urban areas.

These findings indicate that the concerns of medical educators and public health officials over the poor distribution of all physicians (31%) and especially primary care physicians (36%) in rural Appalachia are well founded. The distribution of West Virginia physicians indicates that the trend toward urban practice, as described for Appalachia, does not hold true for West Virginia's physician population. In West Virginia, 62% of those in primary care and 60% of all physicians were practicing in rural regions throughout the state. The percentage of primary care physicians practicing in rural counties of West Virginia nearly matched the rural population distribution for this state (65% in rural counties) during the time period studied. When West Virginia is excluded from the analyses, the distribution of primary care physicians in the rest of Appalachia (32% in rural counties) falls far below the rural population distribution (47%).

These data support concerns that the physicians who are returning to practice in Appalachia are distributed disproportionately, more to urban rather than rural counties (with the exception of West Virginia).

These findings should be a source of deep concern that medical educators and public health and governmental agencies are failing in their efforts to train and attract physicians who will serve the rural populations of Appalachia. The authors hope that this study's findings will provide a point of reference in the struggle to resolve the numerous health care delivery problems of Appalachian communities.

The authors acknowledge Ms. Terrie Roberts, Ms. Jennifer Morgan, and Mr. Jamey Toothman for their technical assistance throughout the preparation of this paper.

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A Review of Studies Concerning Effects of Sleep Deprivation and Fatigue on Residents' Performance

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Abstract—Possible effects of sleep deprivation and fatigue on the performance and well-being of residents have received little scientific examination until recently. This article is a review of the studies on this topic published since 1970. All those studies that dealt with residents' moods and attitudes demonstrated deleterious effects of sleep deprivation and fatigue. The implications of this finding for patient care deserve exploration. Residents' acuity on performance tests requiring prolonged vigilance tended to deteriorate with acute sleep loss, while their performances on most brief psychomotor tests measuring manual dexterity, reaction times, and short-term recall were not adversely affected. The data presently available suggest that sleep-deprived or fatigued house officers can compensate for sleep loss in crises or other novel situations. However, sleep-deprived residents may be more prone to errors on routine, repetitive tasks and tasks that require sustained vigilance, which form a substantial portion of residents' workload. The authors concur with the recommendation of the Executive Council of the Association of American Medical Colleges that the total working hours for residents should not exceed 80 hours per week averaged over four weeks. *Acad. Med.* 66(1991):687–693.

The death of a young woman under the care of residents in a New York City hospital in 1984 led to a grand jury investigation and national media coverage. The grand jury's determination that the residents' fatigue and lack of supervision might have contributed to the patient's death set in motion forces that have substantially altered the structure of physician training in the United States.[1,2] In 1989 the New York State Hospital Review and Planning Council amended the state's hospital code to restrict the number of hours worked by resident physicians and to regulate supervision.[3] At the same time, the Accreditation Council on Graduate Medical Education requested each of the 24 major specialties to develop individual accreditation rules for residents' working conditions. The specialty with the most residents, internal medicine, made the first and most radical change, implementing an 80-hour work week limit. Other specialties, such as general surgery, currently have no limit on working hours. Failure to develop universal guidelines for residents' working conditions has caused a rift among member organizations of the Accreditation Council for Graduate Medical Education.[4]

The perpetuation of long hours in residency training has been criticized by some as a form of hazing or rite of passage,[5,6] and defended by others as a necessary component of medical training.[7] The American Medical Association's Center for Health Policy Research reported that in 1987, the average resident spent 79.2 hours per week performing residency-related duties. Interns average 85 hours per week for all specialties combined and over 100 hours per week in surgery specialties.[8] Many hospitals' schedules are structured in such a way that residents' night call and long hours are an integral part of the way in which care is provided to patients. One reason this is of concern is that in today's legal climate, hospitals may be held accountable for unfavorable outcomes deemed by juries to have resulted from exhaustion on the part of the housestaff.

Despite the strong opinions expressed regarding the effects of long working hours and sleep deprivation on residents' performance, this subject has received relatively little scientific examination until recently. Asken and Raham provided a review of the relevant literature in 1983, and identified only six studies involving physicians.[9] More recently, national attention to residents' working conditions has resulted in a proliferation of articles on the topics. The present review was undertaken to assess the scientific evidence regarding the effects of sleep deprivation and fatigue on residents' performance and well-being.

Method

The present review identified experimental studies that measured the effects of sleep deprivation and fatigue on residents' performances, moods, attitudes, and interactions with patients. The following databases were searched from 1980 to the present: MEDLINE, *Psychological Abstracts*, *Biological Abstracts*, and *Psychological Information.* From these references, key studies prior to 1980 were identified. All studies since 1970 involving the effects of sleep deprivation and fatigue on physicians in training[10–36] are summarized in Table 1. The extensive literature on sleep physiology and sleep disruption in the nonphysician population was not comprehensively reviewed.

Findings

As shown in Table 1, many of the studies used more than one measurement instrument to evaluate residents' well-being and performance. However, for the sake of clarity in the

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Table 1
Post-1970 Studies of the Effects of Sleep Deprivation and Fatigue on Residents

Source	Persons Studied	Definition of Fatigue or Sleep Loss	Measurement Instruments	Comments
Friedman et al. 1971,[10] 1973[11]	14 medicine interns	Rested: avg. 7.0 hr sleep Fatigued: avg. 1.8 hr sleep	20-min standardized EKG Mood adjective checklist Modified Jarvik questionnaire Psychiatric interviews	Interns were on call every other night, and often two consecutive nights
Goldman et al. 1972[12]	Surgery residents, students, attendings	Rested: not defined Fatigued: <2 hr sleep	Videotapes of surgery	Criteria for surgical performance not defined 33 operations were analyzed
Wilkinson et al. 1975[13]	6,500 house officers	Not defined	Questionnaire	2,454 respondents
Beatty et al. 1977[14]	6 anesthesia residents	Rested: regular sleep Fatigued: <2 hr sleep	50-minute monitoring task Neisser letter search Bradley grammatical reasoning	Monitoring task designed to simulate key aspects of monitoring surgery
Christensen et al. 1977[15]	14 radiology residents	Rested: regular sleep Fatigued: worked 15 hr	25 standardized radiographs	Beeswax nodules imbedded in dogs' lungs used for radiographs
McManus et al. 1977[16]	134 junior house officers	Not defined	Questionnaire	64 respondents
Poulton et al. 1978[17]	30 junior doctors	Sleep debts of 0 to 7 hr at two times of the year	3-min grammatical reasoning 3-min lab form	Sleep debt as defined probably underestimated, true loss of sleep
Leighton and Livingston 1983[18]	12 junior doctors	Rested: regular sleep Fatigued: after call	PASAT Psychological questionnaire	Report was too brief to permit full evaluation of study
Ford and Wentz 1984[19]	27 interns	At 4 times during internship	Critical flicker fusion reaction time Profile of mood states	Subjects studied at 4 times during internship with interviews conducted during on-call, before acute sleep deprivation occurred
Harrah 1984[20]	32 medicine and surgery interns	Rested: avg. 7.4 hr sleep Fatigued: avg. 3.3 hr sleep	Symbol digit modalities Trail-making test B Raven's standard progressive matrices Bradley grammatical reasoning Category accessing team Stroop color word test	Specialty played a role in determining performances of sleep-deprived residents
Hawkins et al. 1985[21]	68 residents	Rested: >5 hr sleep Fatigued: <5 hr measured at two times of the year	Raven's progressive matrices Trail making Nutrition questionnaire	Quantity and quality of food consumed in previous 24 hr were positively correlated with performances on tests
Klose et al. 1985[22]	14 anesthesia residents	Rested: 8 AM Monday Fatigued: after successive calls	Digit symbol Wisconsin card sort Purdue pegboard Stroop color word test	Subjects tested on 5 consecutive days, confounding effects of fatigue with learning effects

Table 1—*Continued*

Source	Persons Studied	Definition of Fatigue or Sleep Loss	Measurement Instruments	Comments
Narang and Laycock 1986[23]	16 anesthesia residents	Rested: at 1400 Fatigued: at 2300 or 0200	Critical flicker fusion reaction time Choice reaction time	Residents tested at 1400, 1600, and 0200
Denisco et al. 1987[24]	21 anesthesia residents	Rested: regular sleep Fatigued: after call	30-min simulated videotape	Subjects were to detect "significant changes in monitor-parameters," but were given no definition of "significant" change
Reznick and Folse 1987[25]	21 surgery residents	Rested: >5 hr sleep Fatigued: <3 hr sleep	Factual recall 11-min lab forms Simulated suturing Purdue pegboard Manual dexterity	Only 12 subjects completed testing in both rested and fatigued states
Engel et al. 1978[26]	7 medicine interns	Rested: avg. 7.3 hr sleep Fatigued: avg. 3.6 hr sleep	Actors as simulated outpatients Profile of mood stress	Clinical performances evaluated by checklist of interview content and notes
Hart et al. 1987[27]	30 medicine interns	Rested: avg. 7.9 hr sleep Fatigued: avg. 2.7 hr sleep	Sternberg Short Memory PASAT Immediate story recall Delayed story recall Multiple-affect checklist Multiple affect Thinking efficiency	Long-term recall affected more than short-term recall after sleep loss
Bartle et al. 1988[28] Light et al. 1989[29]	42 surgery residents	Rested: >4 hr sleep Fatigued: <4 hr sleep	Digit symbol Story memory Digit vigilance Trail making PASAT Raven's advanced matrices Purdue pegboard Profile of mood states	Differences between interns and more senior residents was noted in mood states and manual dexterity
Deaconson et al. 1988[30]	26 surgery residents	Rested: >4 hr sleep Fatigued: <4 hr sleep	PASAT Trail making Grammatical reasoning Minnesota form board Purdue pegboard Subjective fatigue Subjective motivation	Cash incentive for performance Residents on every-other night call
Sharp et al. 1988[31]	7 interns	Rested: new residents Fatigued: mean sleep loss 2.5 hr	Wilkinson unprepared reaction time Serial search test Verbal reasoning Profile of mood states	Subjects studied the week prior to starting into residency, also studied sulfatoxymelatonin excretion
Bertram 1988[32]	10 second-year residents	Number of hours worked	Records of patient encounters	ER shifts from 10 to 14 hr long
Storer et al. 1989[33]	45 pediatrics residents	Rested: regular sleep Fatigued: after 24 hr and 36 hr	30-item test Endotracheal intubation Vein catheterization Artery catheterization	Subjects stayed awake voluntarily not in the course of clinical duties

Table 1 —*Continued*

Source	Persons Studied	Definition of Fatigue or Sleep Loss	Measurement Instruments	Comments
Lewittes and Marshall 1989[34]	2,600 residents	Not defined	Questionnaire	1,805 respondents
Orton and Gruzelier 1989[35]	20 house officers	Rested: without call Fatigued: after call	Choice reaction time Vigilance reaction time Haptic sorting task Profile of mood states	Subjects studied after working 31 hours
Jacques et al. 1990[36]	353 family practice residents	Not defined	4-hr in-training exam	Linear regression used to evaluate decline in test score with sleep

*The authors reviewed the findings of all post-1970 studies of the effects of sleep deprivation and fatigue in residents. The superscript number that identifies each study corresponds to the number assigned the reference citation for that study in the reference list presented elsewhere in this article.

following text, findings of these studies are grouped according to the nature of the measurement instrument.

Surveys of House Officers

There have been three published reports of house officers' opinions about the hours they work and the effects of long hours on patient care. Wilkinson and colleagues[13] sent a questionnaire regarding sleep deprivation to 6,500 house officers in Great Britain. Of the 2,452 residents who responded, 37% reported that their hours of duty were always or often long enough to impair their ability to work with adequate efficiency. The respondents were invited to make open ended comments; 141 residents recounted actual errors caused by overwork and sleep deprivation. These findings were substantiated by McManus and colleagues,[16] who surveyed graduates of the University of Birmingham. In this survey, 39% of the respondents indicated that sleep loss commonly affected their working efficiency, and 28% indicated that sleep loss affected their relationships with patients.

In a more recent study, Lewittes and Marshall[34] surveyed 1,806 house officers in Ontario, Canada. In this study, 70% of the respondents indicated that they were often bothered that the amount of work interfered with how well the work was done. Six percent of all the respondents and 10% of the interns indicated that they were often bothered that the quality of patient care was affected by fatigue.

Studies of Mood, Affect, or Attitude

Ten of the studies reviewed for this report used standardized mood scales or other measures to assess the effects of sleep deprivation on residents' moods and attitudes. Friedman and colleagues[10,11] carried out the most widely quoted study. In this study using a modified Jarvic questionnaire, sleep-deprived interns reported more sadness and less egotism and social affection on a mood questionnaire, and significantly more psychophysiologic abnormalities, than did rested residents. During short interviews following standardized tests, sleep-deprived interns reported such psychological problems as difficulty in thinking, depression, irritability, depersonalization, inappropriate affect, and recent memory deficits.

In a longitudinal study, Ford and Wentz[19] evaluated interns at four times during their internship year. Four of the 27 interns had at least one episode of major depression during the year by standard criteria, and an additional 11 claimed to have experienced a clinical depression. Anger, fatigue, and overall dysphoria increased as the year progressed and were found to be negatively correlated with the amount of sleep obtained in the preceding week. Sharp and colleagues[31] also found that interns' moods, as assessed by the Profile of Mood States, were significantly worse after six months of residency due to increases in their anger, tension, confusion, depression, and fatigue.

Six studies[26–30,34] used the profile of mood states or other self-reported data to assess resident affect or motivation after one night's sleep loss. In each study, a deterioration occurred after sleep loss, with residents reporting a greater decrease in thinking efficiency, a greater mood disturbance, more depression, more fatigue, more anxiety, and less motivation than did the control group.

Psychomotor and Neuropsychological Tests

Because of the difficulties in trying to measure actual clinical performances, many studies of sleep deprivation in residents have relied on neuropsychological tests as proxy measure.[14,17–23,25,27,28,30,31,35] The validity of this practice is not known. Over 20 standardized and nonstandardized psychomotor and neuropsychological tests were used in the studies reviewed. The majority of these tests were less than three minutes in duration. The results of residents' performances on short psychomotor tests after the residents had been on call the preceding night are summarized in Table 2. Direct comparison of the results of these studies is difficult because of the wide variety of experimental conditions used in the tests. The only clear trend that is evident is that in short-duration tests manual dexterity, reaction times, and recall tasks did not seem to deteriorate in most studies after one night's sleep loss.

Two studies compared residents' performances at the beginning of the year and later in the year. Sharp and colleagues[31] found that there was a decrease in the Wilkinson unprepared reaction time but no change in a serial search test or a verbal reasoning test. Ford and Wentz[19] tested residents the evening they were on-call at four different times during the year. They actually found that performances improved with decreased sleep in the preceding week and that increased performance was positively correlated with anger as measured by the Profile of Mood States.

Table 2

Studies of Residents' Performances on Short Psychomotor Tests after Residents Had Been on-call[*]

Psychomotor Test	Studies Showing a Decrease in Performance	Studies Showing No Decrease in Performance
Manual dexterity task	—	25
Choice reaction time	—	23, 35
Digit symbol	—	20, 22, 28
Minnesota form board	—	28
Neisser letter search	—	14
Immediate recall	—	27, 28
Wisconsin card sort	—	22
Category assessing time	—	20
Purdue pegboard	29[†]	22, 25, 30
Bradley grammatical reasoning	14	20, 30
Paced auditory serial addition	18	27, 28, 30
Raven's progressive matrices	21	20, 28
Trail-making test	20, 21	28, 30
Sternberg short memory	27	—
Critical flicker fusion	23	—
Stroop color word test	20, 22	—
Haptic sorting task	35	—
Vigilance reaction time	34	—
Delayed story recall	27	—

[*] The authors reviewed the findings of all post-1970 studies on the effects of sleep deprivation and fatigue in residents. This table indicates the findings from all studies of residents' performances on short psychomotor tests after the residents had been on-call the previous night. The studies are listed by their numbers in the reference list of this article.

[†] Only the first-year residents showed a decrease.

Simulated and Actual Performances

A total of 11 studies used actual or simulated clinical situations to evaluate clinical performance. Poulton and colleagues[17] used a three-minute laboratory form, and Reznick and Folse[25] used an 11-minute laboratory form and a simulated suturing technique. For these short tasks there were no significant differences between the sleep-deprived and control groups of residents. Storer and colleagues[33] evaluated residents' procedural skills such as endotracheal intubation, vein catheterization, and artery catheterization, and used a written test consisting of 30 board examination questions. There was a slight increase in the time the residents required to catheterize umbilical arteries in the study but no difference in the other measures of performance between the sleep-deprived and the rested residents. Christianson and colleagues[15] found no difference in the accuracies in identifying simulated pulmonary nodules on standardized chest films between residents who were allowed to review the films in the morning and residents who reviewed the films after they had worked 15 consecutive hours. Similarly, in a study by Engel and colleagues, there was no difference between the clinical performances of rested and sleep-deprived residents who evaluated actors trained to pose as patients seeking medical care for common outpatient problems.

Four studies that evaluated tasks requiring sustained vigilance or concentration did show significant differences between rested and sleep-deprived residents. Friedman and colleagues' study[10] found that sleep-deprived interns made nearly twice as many errors as did rested interns when reading a standardized 20-minute electrocardiogram strip. Beatty and colleagues[14] used a 50-minute simulated monitoring task and Denisco and colleagues[24] used a 30-minute simulated videotape to evaluate the vigilance of anesthesiologists under rested and under sleep-deprived conditions. Both studies showed decreases in performance after a night on call. Jacques and colleagues[36] evaluated the effects of sleep loss on cognitive function using a standardized four-hour in-training examination. Residents at all levels of training showed significant deterioration with sleep loss in their test scores on the four-hour exam.

Only two studies have attempted to evaluate changes in residents' performances with fatigue or sleep loss in actual clinical situations. Goldman and colleagues[12] monitored surgery personnel during 33 operative procedures using a closed-circuit television system. Residents with less than two hours' sleep the previous night performed in a way that was considered "inferior" when compared with the performances of the more rested surgeons. Operative inefficiency and indecision with poorly planned maneuvers exceeded 30% of the operating time. Bertram[32] examined the records of patient encounters of second-year residents during a month of work in an emergency room department. For two common diagnoses, there were decreases in the comprehensiveness of the history and physical examinations recorded in the medical records as the numbers of hours worked by the residents and the numbers of patients they saw increased.

Discussion

An understanding of the effects of sleep loss and fatigue on residents' performances may be put in perspective by considering some of the literature on sleep deprivation in non-physician populations. It appears from the large psychological literature on sleep deprivation that the primary effects of acute sleep deprivation center on impairment of brain function. In healthy non-physicians, behavioral performance and psychological performance measurably decline after one night's sleep loss, and decline further as sleep loss continues. Performance apparently can be improved substantially in sleep-deprived persons by increasing mental effort, particularly if the task is interesting, if it involves perceptual motor skills, or if incentives are provided. However, performances on tasks that are prolonged, dull, or repetitive may be very sensitive to sleep deprivation.[37] Many of the tests used in the studies of residents were of short duration, involved perceptual motor skills, and may not have been sensitive enough to measure true changes in performance. The relevance of performances on such psychomotor tasks to performance of residents' actual clinical work is open to debate.

The effects of chronic sleep deprivation have been less extensively studied than those of acute sleep deprivation. Health non-physician volunteers apparently can tolerate a chronic reduction of up to two and one-half hours sleep per night without significant performance deficits; however, subjective fatigue and a decrease in effort do occur with chronic sleep deprivation.[38–40] In most of the studies involving residents, either all were chronically sleep-deprived or their long-term sleep status was unknown. Several studies of surgery residents that failed to show deterioration of performance on short psychomotor tests after acute sleep deprivation involved residents with schedules of every-other-night call that involved chronic sleep deprivation in excess of that previously studied in non-physician populations. Thus, these studies of surgery residents may have been comparing two or more equally exhausted populations.

Interpretation and comparison of the results of the reviewed studies of fatigue and sleep deprivation in residents are difficult because of the inconsistent definitions of sleep loss, the lack of differentiation between acute and chronic sleep deprivation, and the wide variety of tests and experimental conditions used in the individual studies. In all but two studies, the residents were aware that they were being tested, which may have altered their motivations. In addition, most of the studies used relatively small numbers of residents and may not have been powerful enough to identify small but clinically significant changes in performance.

Despite these limitations, some trends are apparent. The most obvious finding is that mood states clearly change with sleep loss. Hostility and anger were greater in residents after one night's sleep loss and in residents at midyear compared with residents at the start of training. Anger may actually improve performance on short psychomotor tasks. This could mask some of the detrimental effects of sleep deprivation found in other studies where no deterioration of performance was seen on psychomotor tests after sleep deprivation. Mizrahi[41] has addressed the enormous implications of housestaff hostility and anger for quality of patient care in doctor-patient relationships. This topic deserves further systematic study. Symptoms of depression were also commonly reported with acute and chronic sleep deprivation. Although not all the residents reporting depression symptoms meet the criteria for the diagnosis of depression, some residents are clearly at risk for such unfavorable outcomes as leaving the residency or attempting suicide.[42]

The findings of the studies reviewed were less conclusive with respect to the effects of fatigue and sleep deprivation on measures of performance. Although there was some inconsistency of results between the studies, it appears that performances of short tasks that measure manual dexterity, reaction time, and short-term memory are reasonably unchanged after sleep loss. Some procedural skills may require more time to perform. Clinical tasks requiring sustained vigilance or concentration are the most sensitive to sleep loss and fatigue.

It seems reasonable to conclude that residents can compensate for acute sleep deprivation on short tasks when they know they are being tested, but not on tasks of longer duration requiring vigilance. They may be able to perform some tasks as accurately but at a slower pace when acutely sleep-deprived. These conclusions imply that in the world of the hospitals in which they work, acutely sleep-deprived house officers may remain effective, if somewhat less efficient, in crises and other novel situations. Residents may be more prone to errors on the routine, repetitive tasks that constitute much of their work.

Recommendations

Asken and Raham[9] in their review of literature on sleep deprivation in residents, suggested that "at a minimum, a medical education experience should be able to demonstrate that it can live up to the dictum 'above all do no harm.'" The accumulated evidence of studies performed of the past 30 years reviewed in this paper suggests that the traditional system of 100-hour work weeks and 36-hour days may do harm. Clearly, residents' moods, affects, and attitudes are altered unfavorably. Although the effects of sleep deprivation on actual clinical care have yet to be directly measured in large, well-controlled studies, the evidence collected to date suggests that tasks requiring vigilance and prolonged concentration are adversely affected by the sleep losses imposed by residents' work schedules.

In the United States, residents' working conditions are slowly changing. In the absence of better information on the effects of sleep deprivation and fatigue, it seems reasonable to adopt the recommendations offered by the Executive Council of the Association of American Medical Colleges, which state that the total working hours should not exceed 80 hours per week when averaged over four weeks.[43] Government agencies should recognize the added costs imposed by reform and modify direct and indirect education costs appropriately.

In New Zealand, residents' work hours have been limited since 1985. Problems and solutions encountered in New Zealand and in New York's current effort to reduce residents' hours should be closely examined.

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SHORT PAPERS

Residency Directors' Assessments of Which Selection Criteria Best Predict the Performances of Foreign-born Foreign Medical Graduates during Internal Medicine Residencies

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Abstract—In the summer of 1990, 102 directors of internal medicine residency programs from nine areas of the country with the largest numbers of foreign-born foreign medical graduates (FFMGs) were surveyed by mail to determine what criteria used to select FFMGs for residency positions best predicted performance. The directors felt that the most important predictors were performance on the Foreign Medical Graduate Examination in the Medical Sciences or the National Board of Medical Examiners examinations; performance during the interview; and postgraduate clinical experience in the United States. Recent graduation from medical school was felt to be a better predictor than postgraduate clinical experience in a foreign country. Seventy-three percent of the directors found letters of recommendation from a foreign country to be useless. The author suggests the results of this study may be useful to residency programs in evaluating FFMG applicants and to FFMGs in assessing their own credentials. *Acad. Med.* 66(1991):699–701.

While studies have evaluated predictors of residency performance for U.S. graduates, none has done so for foreign-born foreign medical graduates (FFMGs). The purpose of this study was to gather and disseminate information from directors of programs with large numbers of FFMGs regarding the selection criteria that they have found to be most useful in predicting the performances of FFMGs during internal medicine residencies.

Method

Using the National Resident Matching Program data books for the years 1987, 1988, and 1989, the author identified the states that had the largest numbers of FFMGs matched to internal medicine residency positions. The top nine states were New York, Illinois, New Jersey, Maryland, Michigan, Ohio, Pennsylvania, Missouri, and the District of Columbia. These nine areas matched more than 81% of all FFMGs matched to internal medicine in each of the three match years. Using the 1989–1990 Directory of Residency Training Programs,[1] the author mailed a questionnaire to every internal medicine residency program director in these areas. Two hundred and eighteen questionnaires were mailed in July and August 1990.

Program directors were asked to rate (based on their observations) the importances of 22 selection criteria as predictors of FFMGs' performances during residency. The scale for each criterion was 1 to 5, where 1 was "not a predictor" and 5 was "a very important predictor." The directors were also asked how much they agreed (or disagreed) with four statements regarding some of the predictors. The scale for each statement was 1 to 5, where 1 was "strongly disagree," 5, "strongly agree," and 3, "neither agree nor disagree."

Results

One hundred and seventy-one directors (78%) responded. Sixty-nine of these responding directors (40%) indicated that they had had, on the average, fewer than three FFMGs in each of their first-year postgraduate classes over the preceding three years. They were not asked to complete the questionnaire. One hundred and two respondents (60%) had had three or more FFMGs per class, and all of them completed the questionnaire. Of these 102 directors, 50 had had averages of three to eight FFMGs per class, and 52 had had averages of more than eight FFMGs per class.

Table 1 shows the ratings given by the directors to the 22 selection criteria. The selection criteria rated most highly were performance on the Foreign Medical Graduate Examination in the Medical Sciences (FMGEMS) or the National Board of Medical Examiners (NBME) examinations; performance during the interview; and postgraduate clinical experience in the United States. Determining fluency in the English language was rated as the most impor-

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Table 1

Ratings by Internal Medicine Residency Directors of Predictors of Performance during Residency of Foreign-born Foreign Medical Graduates (FFMGs), 1990*

			Program Ratings, by Program Size			
	Overall ($n = 102$)		3–8 FFMGs per Class ($n = 50$)		More than 8 FFMGs per Class ($n = 52$)	
Criterion	Mean	SD	Mean	SD	Mean	SD
1. Score on clinical science component of FMGEMS or NBME II	4.34	0.73	4.37	0.73	4.31	0.73
2. Fluency in English as determined during interview†	4.30	0.74	4.50	0.76	4.12	0.68
3. Number of attempts on clinical science component of FMGEMS or NBME II	4.30	0.69	4.35	0.75	4.25	0.63
4. Postgraduate clinical experience in the United States	4.20	0.93	4.22	0.91	4.17	0.96
5. Number of attempts on basic science component of FMGEMS or NBME I	4.10	0.86	4.19	0.87	4.02	0.85
6. Score on basic science component of FMGEMS or NBME I	4.07	0.95	4.21	0.93	3.94	0.96
7. Interview performance on nonmedical issues (e.g., personality)	4.02	0.84	4.04	0.86	4.00	0.82
8. Medical school (if known to program director)	3.98	0.95	4.10	0.77	3.86	1.10
9. Year of graduation (recent graduates performing better)	3.84	1.02	3.76	0.98	3.92	1.08
10. Performance during interview on medical questions (e.g., quiz, case presentation)	3.65	1.08	3.43	1.13	3.84	1.01
11. Country of medical education	3.64	1.09	3.70	0.97	3.58	1.19
12. Score on Federation Licensing Examination (FLEX)	3.54	1.11	3.73	1.06	3.35	1.15
13. Rank order in medical school class	3.35	1.16	3.24	1.19	3.38	1.14
14. Age (younger graduates performing better irrespective of graduation date)	3.33	1.02	3.38	0.99	3.27	1.06
15. Letters of recommendation from the United States‡	3.27	1.07	3.52	0.99	3.04	1.10
16. Postgraduate clinical experience in foreign country	3.12	1.12	2.98	1.06	3.25	1.17
17. Passing the FLEX before applying for residency‡	3.12	1.16	3.38	1.09	2.87	1.19
18. Duration of living in the United States	3.03	0.98	3.12	1.01	2.94	0.95
19. Medical school grades (transcript)	2.94	1.08	2.94	0.92	2.94	1.21
20. Nonclinical graduate work in the United States (e.g., basic science graduate studies, research)	2.74	1.04	2.74	1.05	2.74	1.05
21. Dean's letter	2.32	0.96	2.39	1.00	2.25	0.93
22. Other letters of recommendation from foreign country	1.93	0.94	1.96	1.01	1.90	0.88

*Those program directors from the nine areas of the country with the largest numbers of FFMGs (NY, IL, NJ, MD, MI, OH, PA, MO, and DC) who had, on the average, at least three FFMGs per class over the three years preceding the summer of 1990 were asked, in a mailed questionnaire, to rate the importances of 22 criteria on a scale of from 1 to 5, where 1 indicated "not a predictor," and 5, "a very important predictor."

†Statistically significant difference in ratings between the two groups, $p < .01$ by Student's t-test.

‡Statistically significant difference in ratings between the two groups, $p < .05$ by Student's t-test.

tant function of the interview; second was assessment of personality; last was assessment of medical knowledge.

Replies concerning how much the directors agreed or disagreed with the four statements were distributed as follows: (1) Seventy-three percent of the directors agreed that letters of recommendation from foreign countries were useless and relied on letters from the United States. Seven percent disagreed and 20% were neutral. (2) Sixty percent agreed that medical school transcripts and class ranks of FFMGs were useless and relied on examination scores. Twenty-one percent disagreed and 19% were neutral. (3) Forty-four percent agreed that FFMGs who had been away from clinical medicine for more than one year performed poorly. Twenty-five percent disagreed and 31% were neutral. (4) Twenty-seven percent agreed that FFMGs straight out of medical school performed better than did those who had done clinical work in a foreign country. Thirty-three percent disagreed and 40% were neutral.

Discussion

Some of the selection criteria identified in this survey receive additional support from the literature. For example, Gunzburger and colleagues[2] studied 40 measures of premedical and medical school performance and found that only NBME Part II examination scores and clerkship grades correlated with first-year residency performance. Others[3] have found performance during internal medicine clerkship and the interview to be the most important variables used by internal medicine program directors in selecting residents. Jolly and colleagues[4] found that the performances of foreign medical graduates in a clinical skills examination correlated most strongly with scores on a knowledge-based examination and scores on an English-language examination. Conn and Cody[5] found correlation between foreign medical graduates' scores on the FMGEMS and performances on a clinical skills examination.

Interestingly, they were unable to show a correlation between U.S. clerkship experience and FFMGs' performances on that clinical skills examination. It is likely that the program directors in the present study used not only the applicants' having had U.S. clinical experience but also the applicants' performances during such experiences as a selection criterion.

This survey's findings with respect to recency of graduation deserve further discussion. The author's interpretation of the responses is that the majority of program directors found a short, but not a prolonged, duration of postgraduate clinical experience in a foreign country beneficial. The lower rating for clinical experience in a foreign country compared with such experience in the United States may be partly explained by the nature of the experience (in many foreign countries, clinical experience is largely limited to infectious, parasitic, and nutritional disorders that are of low prevalence in the United States) and partly by the quality of continued medical education (which is poor to nonexistent in many countries). It is interesting to note that, in previous studies, neither year of graduation[5] nor clinical experience of any kind[4] was found to correlate with performance on a clinical skills examination for foreign medical graduates.

Letters of recommendation are among the most important factors used by programs in selecting residents from graduates of U.S. medical schools.[3] In contrast, letters of recommendation from a foreign country, including deans' letters, received the lowest ratings in our survey. Only 7% of the program directors disagreed with the statement that such letters are useless. In view of this study's results, it seems reasonable to drop foreign letters of recommendation from the application requirements of FFMGs.

The findings of this survey should provide useful guidelines to programs selecting FFMGs for residency positions and useful information to FFMGs for assessing their own credentials.

The author is indebted to Dr. David Kern for his helpful review of the manuscript.

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DECEMBER 1991

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Publishing Services: **Hanley & Belfus, Inc.**
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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students, and $7.00 per single copy. All other locations—$70.00/1 year; $130/2 years; $185/3 years; and $8.00 per single copy.

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SPECIAL ARTICLES

ROBERT F. JONES, Ph.D.

The End of Mandatory Retirement and Its Implications for Academic Medicine

Abstract — The prohibition against age-based mandatory retirement, codified in amendments to the Age Discrimination in Employment Act (ADEA) in 1986, remains a concern in the academic medical community. A seven-year exemption covering tenured faculty expires at the end of 1993. The author reviews the legislative history of the ADEA and explores in detail the planning and management issues — and the available projections of likely faculty behavior in the future — concerning the banning of age-based mandatory retirement of higher education faculty, with special reference to the academic medical community. Although the major studies concerning the probable course of events after the seven-year exemption expires indicate that there will not be a cataclysmic effect on institutions of higher education, it is still not certain how tenured faculty will behave and how that will affect medical schools. The author cautions that the management acumen of institutional leaders will be taxed, and that medical school deans should realize this and begin the transition into the new era by improving systems for faculty evaluation and development, clarifying the financial guarantees of tenure, implementing space utilization reviews, and developing programs to make retirement attractive. *Acad. Med.* 66(1991):711–718.

The prohibition against age-based mandatory retirement, codified in amendments to the Age Discrimination in Employment Act (ADEA) in 1986,[1] remains a concern in the academic medical community, particularly among institutional leaders. Softening the immediate impact of the legislation was a seven-year exemption covering tenured faculty, which is set to expire December 31, 1993. In an effort to determine whether such an exemption should be made permanent, Congress commissioned the National Academy of Sciences (NAS) to conduct a study of the impact on higher education of "uncapping" the retirement age. The NAS Committee on Mandatory Retirement in Higher Education (hereinafter the NAS Committee), which was charged with that study, has now released its report and concluded that the exemption for tenured faculty should be allowed to expire.[2]

The NAS Committee conducted a thorough examination of the issue and its conclusions are well documented. Yet, they should not be interpreted to mean that ending mandatory retirement will be inconsequential for institutions. The implications of ending mandatory retirement for *planning* must be distinguished from those for *management*. The NAS Committee focused largely on the former issues. Data available to the NAS Committee (and reviewed here) suggest that fears of the delayed retirement of faculty members are largely overstated; indeed, a greater challenge for planning may be how to replenish faculties depleted by large numbers of retirements. However, the management problems institutions experience as a result of ending mandatory retirement may be profound, and in many respects will change the way in which schools conduct their business. It is these problems that constitute the main focus of this paper. Prior to addressing them, however, the legislative history and planning issues that have engaged the political debate are described.

Legislative History

Although passage of the ADEA amendments in 1986 came as a surprise to many in the academic medical community, it was in fact the culmination of a longstanding political and legislative debate on the civil rights of the elderly. The debate can be traced back at least to the 1961 White House Conference on Aging.[3] It was not until 1967, the year of the original ADEA, that safeguards protecting those between the ages of 40 and 65 from discrimination in employment on the basis of age were enacted into law. While the ADEA was a major advance for those fighting against age discrimination, it was also a setback, since it codified the then-prevalent practice of having workers retire involuntarily at age 65.

The considerable political influence wielded by the American Association of Retired Persons (AARP) and the personal championship of the late Representative Claude Pepper led to the passage in 1978 of amendments to ADEA that raised the mandatory retirement age from 65 to 70.[4] The higher education community in Washington lobbied hard against the 1978 amendments. While unsuccessful, it did obtain a specific, three-year exemption for tenured faculty. That exemption expired without fanfare in 1982. Many institutions had changed their policies immediately to a mandatory retirement age of 70.[5]

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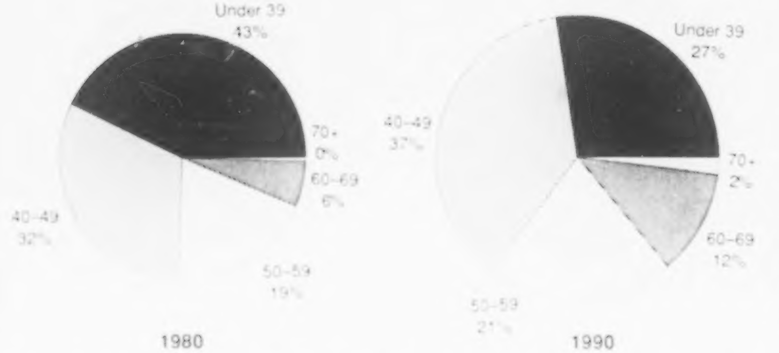

Figure 1. **Ages of U.S. medical school faculty members. (Source: AAMC Faculty Roster.)**

Stauffer[6] reports that discussion on prohibiting mandatory retirement at any age began almost immediately after passage of the 1978 amendments, but it took until 1986 to see that goal codified into law. When passage of the 1986 amendments appeared certain, the higher education community, led by the American Council on Education (ACE), pressed for a 15-year exemption. ACE argued that this period would enable institutions to retire the cohort of faculty hired during the expansion era of the 1960s. The seven-year exemption was a political compromise offered to the higher education community on a "take-it-or-leave-it" basis.[3]

Since 1986, organized opposition to uncapping has nearly dissipated. The American Association of University Professors (AAUP), which to the surprise of some had supported mandatory retirement, reversed its position and announced that it would no longer oppose the ending of the tenured faculty exemption.[7] The AAUP was initially concerned that eliminating mandatory retirement would seriously limit advancement opportunities for junior faculty and threaten the concept of tenure in higher education. It has now decided that these concerns are largely unfounded.[8,9]

The ground swell in Congress in support of ending mandatory retirement — passage of the 1986 amendments to ADEA in the House of Representatives was unanimous — has been mirrored in state legislatures. Before 1986, only six states had statutes that prohibited mandatory retirement for all, including tenured faculty: Florida, Maine, Montana, Utah, Wisconsin, and Nevada (at least eight more, including New York and California, prohibited mandatory retirement, but tenured faculty were exempted). Since 1986, Hawaii, Virginia, and Texas have passed laws forbidding mandatory retirement, including that of tenured faculty.

Planning Issues

The primary argument in support of mandatory retirement is based on the assumption that faculty members will delay retirement beyond age 70 when permitted to do so, or at least that a significant number will, and that these may well be among the least productive members of the academic community. If true, three consequences would ensue:

1. fewer positions would be available for new hires, particularly for women and minorities, who are now underrepresented, thus limiting faculty renewal (the so-called "lost generation of scholars" argument);
2. the faculty as a whole would be older, and this would have consequent negative implications for productivity; and
3. an older faculty with correspondingly high salaries would create severe economic hardship for institutions.

A comparison of the age distributions of medical school faculty now and a decade earlier highlights the significance of these issues. In 1980, only one-fourth of the faculty were 50 years old or older; today that group constitutes more than one-third of faculty members (Figure 1). Whether the current cohort of age 50+ faculty, hired during the period of expansion in the 1960s and early 1970s, chooses to retire at the normal age or opts for extended service clearly has important implications for medical schools.

Will Faculty Delay Retirement?

If medical school faculty follow national labor trends, there would be little reason to predict their delayed retirement after 1993. The national labor force, spurred by improved pension income arrangements, has shown a penchant for early retirement.[10,11] Studies by the Teachers Insurance Annuity Association - College Retirement Equities Fund (TIAA - CREF) provide a more focused appraisal of faculty retirement patterns, although not an unequivocal one, since participants in TIAA - CREF plans include staff as well as faculty at member institutions. The ages at which participants in these plans have elected to start receiving annuity income have become more varied over the past decade, but with little change on average.[12]

Faculty responses to the 1978 Amendments to the ADEA, which raised the mandatory retirement age from 65 to 70, provide perhaps the best glimpse of the behavior that is likely when the age is uncapped altogether. The law allowed institutions a three-year (until 1982) exemption for tenured faculty. One study,[13] based on data from 12 public institutions that are members of the Association of American Universities (AAU), found no change in the average age of retirement between 1982 and 1986. Data collected by the Consortium on Financing Higher Education

(COFHE)[14] showed no change in the retirement ages at eight other public universities during the same time period. Friedman[15] has now confirmed that the average ages of retirement (defined as final separation from full-time academic employment after age 60) that occurred among medical school faculty during this period fluctuated in the narrow range of 66.1 to 66.7 years.

Data from the COFHE study revealed a retirement trend for the 16 private research universities and seven private liberal arts colleges in the sample that was different from that observed at the public universities. At the former group of schools the average age at retirement increased from 64.7 to 66.3 years between 1982 and 1986. In another study[16] it was determined that faculty at private institutions anticipated a later retirement age (by two years) than did faculty at public institutions. While these differences in retirement patterns are modest, they do explain why concerns about the deleterious consequences of uncapping appear to be expressed most vociferously by private, often research-intensive, institutions.[17] These institutions have been more reluctant to abandon mandatory retirement voluntarily and have more frequently used exemptions granted to colleges and universities.[16]

The differences in retirement patterns among types of institutions are mirrored in studies of faculty attitudes. In a major survey conducted by the Carnegie Foundation,[18] only 37% of faculty from research universities expressed an interest in an early retirement option, the lowest percentage among the faculties from the five types of institutions studied. Faculty at research universities were also least likely to acknowledge that they looked forward to retirement as an enjoyable period of life. One factor posited to explain why faculty at research universities are less anxious to retire is that their teaching loads, which for faculty at most institutions may serve as an incentive to retirement, are lighter. The prospect that faculty at private, research-intensive universities may be more likely to delay retirement under the new law has been acknowledged by the AAUP.[8] Moreover, the NAS Committee singled out research-intensive institutions as the one category of institutions likely to witness high numbers of faculty delaying retirement past age 70 when permitted to do so.[2]

The premise that delayed retirement will be selective and include disproportionately faculty who contribute little to the academic enterprise deserves serious consideration. Protected by tenure, these few faculty members in a period of limited resources may be enough to constrain new initiatives in teaching and research and consign departments to enduring mediocrity. However, there is little support for the nightmarish implications of this premise. Studies by TIAA-CREF[19] indicate that the four factors retirees posit as the most important in that decision are (in order of importance): (1) the degree of assurance of a satisfactory retirement income; (2) the state of one's health; (3) the degree of satisfaction or dissatisfaction with one's job; and (4) the extent to which one is able to perform the job up to expectations. These last two reasons suggest that faculty whose productivity is diminished may be least motivated to continue.

Studies of faculty who retire tend to support this thesis. Faculty who publish frequently and have earned numerous awards tend to retire later.[20] Those who exhibit or report a decline in research activity[16,21] or indicate a lessened enthusiasm for teaching[22] are likely to retire earlier. Institutions may have to deal with individual cases that are counter to this trend, but they are likely to be the exception. As such, they constitute a management rather than a planning problem.

In conclusion, the change in law raising the mandatory retirement age from 65 to 70 at most had a small effect on the age at which faculty chose to retire. There is no reason to expect that uncapping would have a more dramatic impact. Some schools may experience no change in retirement patterns. Private, research-intensive institutions may be the one exception to this general trend.

Fewer Positions for New Hires?

The effect that uncapping might have on reducing the number of faculty positions available for new hires—to stimulate faculty renewal in general and to remedy the underrepresentation of women and minorities in particular—is an argument raised by supporters of mandatory retirement that receives instant recognition and sympathy. However, a simple analysis shows that massive change in the retirement patterns of faculty would be needed to have any long-term impact on the ability of institutions to renew their faculties. For example, if faculty tended to delay retirement for a few years on average, thus shifting the distribution of retirement ages, institutions would experience in those first few years a decrease in the expected retirement rate and, all other things being equal, fewer openings. But the major impact would be short-term. After the delays in retirements are accommodated, that is, retirement ages stabilize in a new distribution, openings via retirement should occur at nearly the same rate as before.

Friedman[23] has demonstrated this in his modeling of the retirement and renewal process among health sciences faculty in the University of California system. The impact of a projected delayed retirement was found to be relatively inconsequential. Critical to the ability of institutions to renew faculties were assumptions about the faculty growth rate. Friedman[15] has now repeated his study using data from the national roster of medical school faculty maintained by the AAMC. His conclusion is unchanged.

Despite predictions that medical school faculties will not grow significantly over the next decade, certainly not at the rate that produced a sixfold increase since 1960, the problem confronting medical schools may not be the lack of openings but a lack of people to fill them. While initial concerns in the higher education community about eliminating mandatory retirement focused on the prediction that most of the faculty members hired in the 1960s would not retire, a more recent anxiety is the problem in reverse: what happens when they do retire. Some recent studies have predicted a severe shortage of faculty in other academic and professional fields, including humanities and social sciences,[24] as well as in languages, mathematics, life sciences, physical sciences, engineering, and science and engineering technology.[11] These projections are based on the large percentages of older faculty in these fields. Losier and Dooris[13] indicate that the rate of faculty retirements will increase 150% during the late 1990s. In another study, Connellan[25] has projected the retirement rate to double through the year 2010.

None of these studies is based specifically on medical school faculty, but a review of Figure 1 indicates that similar scenarios for academic medicine can be imagined. In fact, concern about this issue has already been raised, mainly in the context of renewing the pool of trained biomedical researchers.[26]

A Less Productive Faculty?

Medical school faculties are older; delayed retirement would make them older still. The degree to which advanced age translates into diminished effectiveness has been the focus of studies that have yielded mixed results.

For example, the hypothesis that with advancing age teaching effectiveness, at least as measured by students' ratings, is diminished is generally not supported.[27,28] Studies have shown that the relationship between age and research productivity varies by discipline.[29] In fields where there are documented declines in performance, the relationship is typically quite weak. For example, one study of biochemistry faculty[30] revealed a deleterious effect of aging on productivity, as measured by published research articles, but age alone accounted for less than 2% of the variance.

Sherman and colleagues,[31] also using publications as a measure of performance, found relationships between career age and research productivity among medical school faculty that differed by discipline. Publishing trends of faculty with M.D. degrees in surgery specialties, hospital-based specialties, and basic sciences each could be portrayed by an inverted-U-shaped curve, documenting a midcareer peak period of productivity followed by a steady decline. However, those in medical specialties and behavioral specialties tended to reach and maintain a plateau in publishing in both refereed and non-refereed journals.

The clinical performance of faculty with M.D. degrees, and how it might decline with age, is a further consideration. Here, a more pressing value than publication may be at stake: patient safety, particularly in specialties that depend upon manual and psychomotor skills. Those who press this argument, however, misunderstand that supporters of uncapping do not deny the eventual diminution of skills and intellectual contributions over time. They simply argue that there are a number of factors that moderate the relationship between age and performance, and that age itself is a poor proxy for direct observation and assessment. Current trends to institute relicensure and recertification requirements are consistent with this theme.

Higher Faculty Costs?

The increase in institutional costs that would accompany delays in faculty retirement is evident. Faculty salaries are directly correlated with age. Also, unlike the impact of delayed retirement on openings for new faculty hires, this effect would be permanent. Delayed retirements would force a shift in the age distributions of faculties, eventually stabilizing but at a higher median point. Actually, increases in faculty salary costs have presumably been occurring as a result of the aging of the faculty over the last decade, although the specific effect of faculty aging on faculty costs has not been estimated.

Simulation studies of the financial impact for colleges and universities of raising the mandatory retirement age from 65 to 70, under worst-case scenarios, have resulted in estimated cost increases of 3% or less.[16,20] The financial impact for medical schools could be more or less than this percentage. Complicating such an analysis is the degree to which medical school faculty derive their own salary support through research grants or clinical practice. Continuing salaries for certain faculty can indeed be burdensome, for example, former chairs, who may no longer have grants to support the salary or the space they maintain. Yet, other cases are evident in which the retirement of a faculty member would be financially disadvantageous to the institution. In research particularly, the eminence of certain older faculty can be a boon in securing research funding.[32]

While a 3% increase in costs is generally regarded as insignificant for a school of arts and sciences, it may be less so for a medical school. In a $10-million-dollar department of medicine budget, a 3% increase would rob dollars that could be used to support between three and five faculty, assuming that they earn half their annual compensation through grants or clinical practice. A high financial price to be paid by institutions for ending mandatory retirement may not be inevitable, however, particularly if certain management initiatives, proposed in the next section, are pursued.

Management Issues

The management challenges presented by the end of mandatory retirement tend to fall in four areas. First, medical schools will face increasing pressure to implement more active systems for faculty evaluation and development. Second, they will need to define more clearly the guarantees of tenure, in particular, financial support guarantees. Third, they will be required to initiate changes in institutional culture regarding the "ownership" of space, particularly scarce laboratory space. Fourth, they will be encouraged to develop, in concert with their parent universities, a several-pronged program to make retirement more attractive, particularly for selected members of the faculty.

Faculty Evaluation and Development

When mandatory retirement ends, institutions will no longer have a painless method for discharging faculty who are incompetent or who have otherwise become "disengaged." In actuality, mandatory retirement has been only marginally effective in helping institutions deal with these problems. Uncapping may cause institutions to deal with these issues more directly.

The case of the truly incompetent faculty member, one who has become an anathema to peers and colleagues, is admittedly an infrequent problem. However, protected by tenure, such persons have been viewed as immune from normal review processes and impervious to suspension and removal. Even the AAUP is quick to assert that such protections are a distortion of the concept of tenure and, as such, weaken it. Despite this, institutions have been reluctant to confront the issue directly, no doubt fearing the financial and energy-dissipating consequences of protracted court battles. Although the courts tend to respect and support academic decision making when institutions follow their own pre-established procedures,[33] medical schools may anticipate success in litigation as only a Pyrrhic victory. The University of California at Berkeley has developed a proposal[34] in which "gross incompetence" is defined and procedures for dismissing professors who meet the definition are outlined. While the proposal has not yet met with acceptance, it is one of several signs that the uncapping of mandatory retirement is strengthening the resolve of institutions to confront the issue of incompetent faculty more directly.[35,36]

A more frequent problem is that of the "disengaged" faculty member. Such individuals may be only marginally productive for various reasons. Their fields of expertise may have declined in importance, or their personal capacities may have diminished, or simply the promise they showed upon the award of tenure may not have been fulfilled. Disengaged faculty can be identified typically in their mid-fifties; therefore, mandatory retirement at age 70 has always been limited as a mechanism to deal with such cases.[37]

Proposed changes to deal with this problem inevitably include instituting some form of post-tenure performance evaluation, a practice viewed with suspicion by some faculty as a subterfuge for undermining tenure and due process. It need not be. Post-tenure review that is faculty-designed, formative in purpose, and tied to a visible faculty development program to which the institution has put resources is the logical response to this issue.[38,39] As one example, a system-wide University of California committee dealing with the health sciences has proposed creation of a "faculty development committee" to which tenured faculty members who fail to receive normal merit advancement would be directed.[37] The committee would be charged with monitoring the progress of the faculty member as he or she pursued the terms of a negotiated "constructive contract." The University of Hawaii has already had success in instituting a similar plan.[40] Early intervention and an institutional culture that stresses development appear to be key to forestalling problems of faculty disengagement.

These initiatives, if they become more widespread, guarantee an evolution in the concept of tenure. As the right to serve until the age of retirement, tenure inevitably must be redefined now that retirement age is no longer fixed. A corollary to this is a shift away from the academic culture and toward a more management-oriented culture at many institutions. It parallels shifts in culture that medical school faculty have already experienced in the delivery of health services: a new-found preoccupation with efficiency, outcomes, and accountability. It is a shift long feared by those who oppose the elimination of mandatory retirement, and it is not without risk. Of paramount importance will be the development of evaluation procedures that are deemed to be fair and gain the support of tenured faculty. Equally important will be managerial acumen and sensitivity in the implementation of these procedures.

Guarantees of Tenure

The practice of granting tenure has been adopted widely in academic medicine. Only six of the nation's 126 accredited medical schools do not recognize tenure, while another seven observe it only in the case of basic science faculty. Despite its near ubiquity, the meaning attached to tenure among institutions is far from uniform and unambiguous. In a 1983 survey,[41] respondents from 101 medical schools indicated the following as "guaranteed" by tenure at their institutions: "total salary" (13%); "teaching salary" (11%); "percentage of some stated salary figure" (7%); "continued appointment at a designated faculty rank without salary guarantee" (47%); "other" (33%). Many of the respondents who opted for the last category stated frankly that the guarantees of tenure awarded at their institutions were unclear.

The variety of sources of funds from which medical school faculty salaries are paid and the degrees to which medical school revenues are generated by the faculty themselves, through research and clinical service, further complicate the picture for academic medicine. As a result, it is not uncommon for tenured faculty to be paid salaries from essentially "soft" sources, such as research grants. A drying-up of such grants can cause immediate and severe problems for the institution in such cases. In addition, administrative responsibilities, such as those assumed by a department chair, may result in a special salary adjustment, but the link between those responsibilities and the salary differential is not always made clear.

Clearer communications with faculty about the sources of their support, the guarantees attached to those sources, and the special protections afforded them in the award of tenure must replace the vague understandings that exist in many places today. Medical schools obviously cannot provide open-ended guarantees to those whose research funding or clinical service affords them remuneration that far exceeds that of their colleagues on the main campus. Already, there appears to be some recognition of this fact.[42]

Space Management

The most precious institutional resource tied up by faculty who delay retirement may not be high salary costs, but space. Space is often viewed as the limiting factor in the expansion of biomedical research programs. In an era in which direct federal funding for construction of facilities has been virtually nonexistent, increasing the amount of research space has been difficult, intensifying the need for an active program of monitoring space utilization and productivity.

Several schools have active programs in this area.[43] The methods include formula-based approaches that link assigned square feet to revenues generated by the space, those that are based on predetermined institutional priorities for space assignment, and those that rely on traditional faculty peer review procedures for evaluating space utilization and making recommendations for change. Each of these schools has been able to gain faculty acceptance for space reallocation based on predefined methods and criteria.

At many other schools, the political culture creates obstacles to active space management and utilization review. Faculty members' space is sometimes viewed, like their titles, as protected by tenure, although no rational basis for the practice exists. Changing this culture requires the awareness and support of faculty, similar to that for improving systems for faculty performance evaluation. Both changes are in a sense a price for the other protections to be afforded to tenured faculty once the current exemption is lifted.

Incentive Retirement Programs

In considering ways to make retirement attractive when it can no longer be mandated, financial incentives are often the first thought. Yet, the attractiveness to faculty of phased retirement programs[16,22] reflects the value they place on retaining ties to academia. Recognition of this has spurred an interest in formalizing plans for emeritus status.[44]

Policies regarding and provisions for emeriti are usually determined by central university administration. Medical schools need to understand how such policies and provisions deter or encourage medical school faculty retirement. Albert[45] has chronicled an extensive list of potential rights and privileges for emeriti. Many of these, for example, library privileges, receipt of campus publications, listings in directories, etc., can be accommodated at little or no cost to the institution. Others are at greater cost, including office space, secretarial support, supplies, and mailing privileges. Office space, even shared, may be difficult to accommodate, but is extremely facilitative of retirement, since it provides faculty with a base for continued writing and consulting.

Opportunities for emeriti to participate in research and teaching, albeit in a limited way, appear to be highly desired. Furnishing laboratory space is generally prohibitive, but other creative ways to involve retired faculty in contributing to the institution are needed. As one example, the University of Wisconsin School of Medicine engages retired faculty as mentors to first-year medical students.

Structured programs for emeriti are likely to become more frequent, even a norm, as a result of institutional concern with the end of mandatory retirement. However, institutions may still need to provide financial incentives to spur faculty retirements. According to Chronister and Kepple,[46] incentive-based early retirement programs are of two varieties: formal plans "with specific guidelines, policies, and procedures under which any faculty member meeting the established criteria for eligibility may apply to participate" and ad hoc plans in which "each early retirement is negotiated separately with the individual faculty member." The latter approach, the buyout, appears to be more common in medical schools. It has the advantage of targeting limited resources to faculty whose retirement is most beneficial to the institution. However, it tends to engender equity concerns and is vulnerable to the perception of rewarding poor performance.

Formal plans are most often university- or state-based and therefore offered to a broad cross section of faculty and nonfaculty employees. As such, they may not provide the right incentives for medical school faculty to participate. To be effective, formal early retirement plans should be thought of as personnel management strategies rather than faculty benefit programs. Plans should be developed with specific objectives in mind and have an eligibility period for enrollment that is time-limited.[46] The University of California's recent decision to offer early retirement is a prime example.[47] Faculty whose ages plus years of service total 80 or more qualify to receive credit for five additional years of service in the calculation of their defined-benefit pension plan if they retire by a specific date in 1991. The program is expected to cut costs significantly. As with other formal plans, a potential problem is that the California plan might encourage productive and valuable faculty to retire, to the detriment of institutions. For this reason, the plan has reserved mechanisms for rehiring faculty on a part-time and/or short-term, contractual basis.

In commenting on the issue of incentive retirement programs as a tool to encourage faculty renewal, the NAS Committee concluded that institutions will need the help of Congress, the Internal Revenue Service, and the Equal Employment Opportunity Commission in preserving institutional flexibility to design programs to meet specified objectives while avoiding discrimination.[2] The NAS Committee was the first to point out that current requirements to continue institutional contributions to defined-contribution retirement plans constitute a disincentive to retirement that institutions need to overcome. The NAS Committee believed that legally permissible ways to limit such contributions, when they result in retirement pensions greater than 100% of salary, need to be designed. Moreover, the NAS Committee noted the difficulties for institutions that Congress has created by declaring as immediately taxable deferred severance pay and urged that institutions be permitted to design incentive retirement programs targeted to specific groups according to institutional need. While Congress may not look favorably on extending the tenured faculty exemption after 1993, it may be responsive to these other importunings.

Conclusion

The ending of mandatory retirement reflects an emerging social ethic: age, like gender and race, cannot be used as a basis for differential treatment. As the population inexorably grows older, this ethic is likely to be reinforced in the public consciousness. Currently, tenured faculty constitute one of only a few societal groups accorded different treatment under the law. This is not likely to continue.

One cannot predict with any certainty how tenured faculty will behave and how that will affect medical schools once the exemption for tenured faculty is lifted. The NAS Committee has reviewed available studies and determined that there will not be a cataclysmic effect on institutions of higher education. However, the management acumen of institutional leaders will be taxed. Medical school deans and department chairs must anticipate this reality and plan accordingly for a new era in which retirement cannot be mandated. Improving systems for faculty evaluation and development, clarifying the financial guarantees of tenure, implementing space utilization reviews, and developing programs to make retirement attractive are places to start.

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LELIA B. HELMS, J.D., Ph.D., and CHARLES M. HELMS, M.D., Ph.D.

Forty Years of Litigation Involving Residents and Their Training: II. Malpractice Issues

Abstract—The authors reviewed 136 cases of malpractice litigation involving residents or programs of graduate medical education that were reported from 1950 through 1989. Before 1970 malpractice constituted the only area of reported litigation for residents. The number of malpractice cases involving residents increased substantially after 1975, paralleling the growth of malpractice cases nationally. The regional pattern of reported cases involving residents also corresponded with previous findings. Questions of vicarious liability, the applicable standard of care, and residents' supervision were at issue in the great majority of cases. Questions related to judicial procedure, immunity from liability, breach or causation, and informed consent were also litigated. Residents were on the side of the prevailing party in 44% of the cases. Malpractice continues to be the key legal issue facing programs of residency training. *Acad. Med.* 66(1991): 718-725.

In a previous paper we identified a substantial body of litigation involving resident physicians and graduate medical education, and reviewed cases concerned with programmatic issues.[1] A much larger group of cases litigating claims of medical malpractice is the focus for this paper. There is little information available in any systematic form about malpractice claims involving residents and programs of graduate medical education.[2] In this study we review the reported litigation, classify the primary issue and decision in each case, and evaluate the results in the context of the available literature on malpractice and resident education. Finally, we discuss the educational implications of malpractice claims as they affect residency training programs.

Method

Cases involving residents or programs of graduate medical education were identified for the period 1950-1989 through the Westlaw computerized legal research services, employing topical indexes and key word descriptors as previously described.[1] While the Westlaw database includes most reported federal and state court decisions, the number of cases reported constitutes but a fraction of the actual number of cases that are actually filed, dismissed, or decided. Moreover, the reporting system is biased toward appellate-level decisions. Despite these limitations, the number of reported decisions provides an indirect indicator of case volume. More important, reported decisions constitute the sole body of law serving as

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precedent to future legal decisions in the area.

Table 1

Cases Involving Issues of Medical Malpractice and Graduate Medical Education

	Federal	State	Total
1950 - 1954	1	4	5
1955 - 1959	1	8	9
1960 - 1964	—	8	8
1965 - 1969	3	7	10
1970 - 1974	4	5	9
1975 - 1979	2	21	23
1980 - 1984	4	26	30
1985 - 1989	5	37	42
Total	20	116	136

Results and Analysis

Reported litigation underwent substantial changes in volume as well as in a broadening of issues litigated over the 40-year study period.

Volume of Litigation

One hundred-thirty six cases of malpractice litigation involving residents or programs of graduate medical education were reported from 1950 through 1989 (Table 1). Litigation increased dramatically during the latter half of the study period. From 1950 through 1974, there was no apparent pattern of growth. From 1975 through 1979, the number of cases reported more than doubled, however, and from 1985 through 1989, the number of reported cases had nearly doubled again.

Malpractice, an issue of negligence, is litigated primarily in state courts that have jurisdiction over common law torts. Consistent with this, 116 (85%) of the cases reported in this study were decided in state courts. The number of malpractice cases varied substantially by state. The regional pattern of occurrence, however, was consistent with previously reported annual incidences of medical malpractice claims indicating highest incidences in the northeastern states and progressively lower incidences in the north central, southern, and western states.[3] New York accounted for 24 (18%) of the malpractice cases. Next in order of frequency of reporting were Pennsylvania and Michigan, with 11 and ten cases, respectively. Only four malpractice cases were identified from California. Twelve states reported no malpractice case at all. The large number of cases from New York may reflect, at least in part, an anomaly in the reporting system, since a greater number of trial court decisions are included in that state's reporting system. Further, according to the American Medical Association's M-E-R-I Database, the number of residency positions offered in New York constitutes 15% of the national total, a proportion far exceeding that of any other state.*

Twenty cases were decided in federal courts. Generally, federal courts hear malpractice cases only when federal standards of diversity jurisdiction can be met. In such instances the parties to the litigation are from different states and the amount of damages exceeds minimum standard, although the case is decided under applicable state law. In only a few cases did an issue arise under federal law, such as the Veterans Administration statutes or the Federal Tort Claims Act.

Issues Giving Rise to Litigation

Table 2 categorizes the reported malpractice cases by the primary issue addressed in the decision by the courts. Malpractice claims litigate the question of negligence, that is, "conduct which falls below the standard established by law for the protection of others against unreasonable risk of harm."[4] In order to establish liability for negligent malpractice, the plaintiff must show that the defendant owed a *duty of care* to the patient and violated the applicable *standard of care*, which resulted in the plaintiff's suffering a compensable injury. In addition, the plaintiff must comply with any jurisdictional or procedural prerequisites to litigation.

Duty of care. The question of who owed a duty of care to the plaintiff was litigated consistently over the entire study period and accounted for 40 (29%) of the 136 cases. The period from 1950 through 1989 witnessed a broadening in the allocation of responsibility between physicians and hospitals. Earlier, the supervising physician had been viewed as "captain of the ship," in command of the medical team and personally responsible for all patient care. Since the *Darling* case in the mid-1960s, the hospital as employer and as health care provider has joined the supervising physician in liability with growing frequency.[5] All of the cases in this group addressed in some way the issue of the allocation of responsibility for the care provided to the patient by the resident.

Most of the cases addressing duty of care turned on the doctrine of vicarious liability by which responsibil-

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*As of 1990, Alabama offered 1,061 residency positions; Arizona, 971; Arkansas, 505; California, 7,947; Colorado, 1,009; Connecticut, 1,650; Delaware, 220; District of Columbia, 2,032; Florida, 2,367; Georgia, 1,593; Hawaii, 402; Idaha, 24; Illinois, 5,276; Indiana, 1,078; Iowa, 851; Kansas, 726; Kentucky, 931; Louisiana, 1,599; Maine, 203; Maryland, 2,162; Massachusetts, 3,943; Michigan, 3,833; Minnesota, 2,112; Mississippi, 447; Missouri, 2,216; Nebraska, 489; Nevada, 101; New Hampshire, 238; New Jersey, 2,458; New Mexico, 361; New York, 14,326; North Carolina, 2,335; North Dakota, 115; Ohio, 4,662; Oklahoma, 730; Oregon, 619; Pennsylvania, 5,907; Puerto Rico, 936; Rhode Island, 471; South Carolina, 918; South Dakota, 91; Tennessee, 1,793; Texas, 5,479; Utah, 511; Vermont, 226; Virginia, 1,744; Washington, 1,303; West Virginia, 500; Wisconsin, 1,462; and Wyoming, 42, a total of 92,975 positions.

Table 2

Issues Giving Rise to Litigation

	Duty of Care	Standard of Care	Failure to Supervise	Judicial Procedures	Sovereign Immunity	Breach/ Causation	Informed Consent	Other	Total
1950-54	2	1	—	—	—	2	—	—	5
1955-59	6	2	—	—	—	—	—	1	9
1960-64	6	1	—	—	—	1	—	—	8
1965-69	2	3	2	1	—	1	—	1	10
1970-74	4	2	1	—	2	—	—	—	9
1975-79	9	6	2	1	1	3	1	—	23
1980-84	3	10	6	4	4	—	3	—	30
1985-89	8	3	4	12	7	3	2	3	42
Total	40	28	15	18	14	10	6	5	136

ity for the actions of the resident was assigned to the hospital in addition to the primary duty of care assigned to the supervising physician. Generally, liability for injuries suffered by a patient is predicated on a finding that the supervising physician or resident directly failed to exercise the appropriate level of care. To impose vicarious liability upon a hospital, two preconditions must be met. First, there must be a relationship between the resident and the hospital. Most commonly, this exists in the form of an employer-employee or a "borrowed servant" relationship. Second, vicarious liability requires that the resident act within the contemplated scope of the relationship when committing the alleged misdeed. Imposition of vicarious liability upon the hospital does not necessarily exculpate the resident or the supervising physician. It theoretically provides an incentive for those in positions of authority to act with diligence and to coordinate oversight of care delivered by residents and physicians. In practical terms, however, a finding of vicarious liability provides the claimant with other, often more solvent, defendants ("deeper pockets"). Thus, residents defending malpractice claims may often be ancillary parties caught in the legal battle to allocate responsibility between the supervising physician and the hospital. This sorting and distribution of responsibility becomes an even more complex exercise when residency programs utilize different hospitals for training and rely upon contractual arrangements for complex issues of supervision, staffing, reimbursement, and indemnification.

Standard of care. Twenty-eight (21%) of the cases centered on the standard of care provided to the patient. Of these, 19 cases dealt with defining an overall standard of care for the medical profession and thus reflected the general trend toward creation of national, rather than local, standards of practice by which to evaluate physician performance.[5] The remaining nine cases focused on the question of whether a separate standard of care applies to residents. During the study period the standard of care for residents underwent evolution from the earlier expectation of that level of performance expected of an "average" resident at a comparable state of training[6] to the present expectation that the resident perform as a physician, competent by professional standards to practice in his or her specialty area.[7] The courts appear to be willing to impose on a resident that standard of care expected of a physician-specialist precisely because it is assumed that there will be a "high level of direct supervision by attending physicians."[5]

Failure to supervise. Fifteen (11%) of the cases constituted this category, a group that has apparently arisen since 1965. From a legal perspective, this group of cases also addressed standard of care. However, because all focused specifically on whether the responsible physician or hospital failed to supervise the resident appropriately, they are grouped separately. These cases are primarily concerned with the *nature* of the duty and responsibility that a supervising physician or hospital has in overseeing the care given to patients by hospital employees, including residents. Often, such cases have focused on the issue of whether the hospital or supervising physician had "reason to know" or "should have known" facts that would have reasonably led to inferring the existence of danger to a patient. Most cases alleged failure by the physician or hospital to exert control over the resident and discussed the scope of supervision to be exercised over the resident. In one case the plaintiff argued that the department chairman failed to develop appropriate programs to educate residents and procedures to monitor residents' performance and practice.[8] In another case, the plaintiff argued the State Board of Regents failed to ensure appropriate evaluation and monitoring of residents by faculty.[9] Finally, a failure to exercise appropriate supervision by those responsible for residents often led to a counterclaim against the institution by the various competing interests in the litigation. As examples, depending upon the underlying contractual arrangements, an affiliated hospital sued the training program or the employing hospital, or both, for breach of the duty to supervise, while a resident sued the program for failing in its duty to educate. Such cases occurred

Table 3
Prevailing Party

	Duty of Care	Standard of Care	Failure to Supervise	Judicial Procedures	Sovereign Immunity	Breach/ Causation	Informed Consent	Other	Total
Resident	10	15	5	13	7	2	5	3	60
Other	23	12	8	5	4	7	1	2	62
Unclear	7	1	2	—	3	1	—	—	14
Total	40	28	15	18	14	10	6	5	136

when a resident was found to be liable personally or when an insurer challenged a claim for indemnification on a malpractice policy after the hospital or physician was found to be liable.[10]

Judicial procedures. Cases in this group required the courts to interpret statutes or rules governing the plaintiff's right to be in court and/or governing compliance with judicial procedures. Of the 18 cases so classified, all were tried in state courts. Twelve (67%) have been decided since 1985, an indication of increasing interest in this area. This growth in procedural challenges has probably been fueled in part by recent state efforts to enact malpractice reform.[3] Indeed, recent decisions have focused on procedural issues raised by reform efforts: four cases litigated compliance with statutes of limitations[11]; three cases dealt with compliance with changes in service and notice requirement at the appropriate stages of developing a claim[12]; and two cases addressed the allowable scope of discovery by the courts.[13] One case unrelated to tort reform dealt with the issue of whether a resident's statement, given to the hospital insurer and impugning the responsible physician, should be allowed as evidence in court.[14]

Immunity from liability. Fourteen (10%) of the cases litigated the issue of immunity from liability. Of these, half were reported since 1985, reflecting emerging interest in this legal issue.

Under certain circumstances immunity provides a jurisdictional bar to the imposition of liability for negligence. Depending on state law, resident physicians may be entitled to sovereign immunity if acting as agents of the state (e.g., public hospital employee) or charitable immunity if employed by private, not-for-profit organizations. Affiliation agreements between combinations of public and private medical and educational institutions involved in residency training programs pose particularly complex questions of immunity when malpractice is alleged.[15] There is substantial variation in the frequency of reported litigation between states, some of which may be partially attributable to the restrictions with which states apply these doctrines. Over the last five years of this study, cases interpreting changes in the application of the doctrine of sovereign immunity to public hospitals and residents were particular issues in Michigan, Kentucky, and Florida.[16]

Breach or causation. Only ten (7%) of the cases involved factual disputes over the alleged negligent act or over whether the act actually caused the injury. These cases, reported sporadically over the study period, litigated whether the verdict or ruling was supported by the evidence presented, the role of circumstantial evidence and the legal doctrine of *res ipsa loquitur*, and whether the injury suffered was directly caused by the tortious conduct of the defendant or failure of the defendant to diagnose.

Informed consent. Treatment performed without a valid consent may be viewed as battery, a separate cause of action at law, but is frequently linked with malpractice litigation. Six cases were identified that addressed informed consent, all since 1975.[17] Of these, two arose from events in Veterans Administration hospitals and were decided by federal courts. The cases focused on whether the patient knew that the resident and not the supervising physician would be providing care, or alternatively, whether the resident appropriately obtained the patient's consent to a procedure.

Other issues. Five cases could not be specifically categorized.[18] In the earliest, the issue of assumption of risk was decided. In two cases, the court decided issues of contract when insurance carriers disputed a hospital's right to indemnification for a malpractice award against a resident. State limits on recovery for malpractice enacted as a reform effort were challenged in one case. Finally, a claim that a residency program failed to provide an education adequate to ensure competency in practice was litigated.

Prevailing Party

Most of the cases reviewed could be categorized by winning party, in this instance either the party aligned with the resident or the opposing party (Table 3). In several cases a winner could not be determined from the facts of the case, either because the issue was entirely procedural or because a remand was required to retry the facts in dispute. Residents have been on the side of the prevailing party in 60 (44%) of the 136 cases. The outcome was unclear or mixed in 14 (10%) of the cases.

Within the categories of issues litigated, there appeared to be substantial variation in the rates of resident success. The lowest success rates for residents and those aligned with them occurred in cases addressing breach/causation (20%), duty of care where allocation of responsibility was the primary question (25%), and failure to supervise (33%). Residents were most successful when litigation challenged whether residents had provided adequate informed consent to patients under their care (83%), or the plaintiff's compliance with procedural prerequisites to the suit (72%).

In the remaining categories of cases, outcomes were mixed. When standard of care was the primary issue, the overall outcomes favored residents in 54% of the decisions. However, within the subgroup of cases focused on the standard of care expected of a resident, the outcomes favored residents in six of nine cases (67%). When the focus was on the standard of care expected of the supervising physician, favorable outcomes dropped to nine of 19 cases (45%). Residents prevailed in 50% of the reported decisions in litigation turning on the question of sovereign immunity. Residents were associated with the prevailing party in 60% of the cases classified as other.

Discussion

Litigation involving residents and programs of graduate medical education has increased in frequency over the past 40 years.[1] Malpractice suits constitute the largest group within the body of resident litigation. Our data suggest that malpractice litigation involving resident physicians has increased substantially since 1975, following temporal and geographic patterns similar to those seen nationally.[3] Before 1970, malpractice constituted the only area of reported litigation for residents.[1] Although clearly not the only area of exposure to litigation now, malpractice continues to be the key legal issue facing programs of residency training today.

A crude estimate of the volume and frequency or malpractice litigation involving residents may be inferred from information available in the literature. For every 1,000,000 hospitalizations, it is estimated that 46,500 injuries occur.[19] Of those injuries, about 7,905 (17%) are thought to arise from negligence. About one in ten negligent injuries result in litigation's being filed in court and, of these, only 1% may be included in the legal reporting system.[20,21] Thus, based on the number of malpractice cases identified in this study through the legal reporting system, we may estimate that 13,700 other suits and 137,000 total injuries related to programs of graduate medical education occurred over the 40-year study period. At least one large study has recently addressed in detail the issue of the frequency of negligence in hospitalization and of claims alleging malpractice.[22]

Potential reasons for the growth in the frequency and diversity of malpractice claims against residents and programs of graduate medical education are several. First, as with suits over general academic issues of graduate medical education, there may be a relationship between the risk of malpractice litigation and the expansion in numbers of residents over the period covered by this study.[1] Second, there is limited evidence that claims against physicians occur more frequently earlier in their careers.[3] This pattern may extend back even into residency training. Third, the growing complexity of the practice environment in which graduate medical programs operate and the increasing severity of illness of patients cared for by residents may also broaden potential exposure to litigation.[5] Fourth, the quality of care afforded patients by residents or the quality of supervision provided residents by faculty physicians may have suffered during the period of expansion in graduate medical education. Although no data support this view directly, it should be of concern to conscientious academicians and accorded attention in the development and administration of residency programs. Fifth, the emergence of state tort reform may be increasing the number of test cases in those states where reform legislation exists. There is evidence from our data that a substantial proportion of recent malpractice litigation involving judicial procedure has challenged tort reform efforts.

The outcome of malpractice litigation involving resident physicians, a 44% success rate generally, appears to be somewhat less favorable than that seen for malpractice cases in general. In one study of three rural states, defendants were reported to have prevailed in 81% of the litigated cases.[23] Over a 20-year period in two urban settings, defendants prevailed less frequently, in 47–73% of cases in San Francisco and 51–75% of cases in Cook County.[24] Care must be taken in interpreting the significance of differences in success rates between resident and practicing physicians. Rates for practicing physicians are derived from studies analyzing all malpractice decisions of courts at the trial level. The present study is limited to reported litigation and, because of limitations of the database, incorporates a strong bias towards appellate level decisions.

Recently, in the proceedings of a conference on the regulation of physician training programs, Samuelson[2] identified three important areas of negligence in graduate medical education: (1) negligence in educational training programs, (2) negligence in supervision, and (3) vicarious liability where the negligent conduct of the trainee is attributed to the supervising physician or employing institution. Results of this survey of the reported case law illustrate the role of the courts in establishing and regulating the liabilities of residents and training programs in two of these three general areas: negligence in supervision and vicarious liability arising from the allocation of responsibility for the duty of care. Together, these two issues constituted 40% of the reported litigation.

Only in the area of negligence in educational training programs, where a program itself was challenged for failing to teach essential information or skills or to require reasonable evidence of competence, did this survey of reported case law find limited evidence of judicial influence. To date, courts in only one state have allowed educational malpractice to be litigated as a separate cause of action at law. That case dealt with secondary schools.[25] Only one case identified by this survey claimed directly that a residency program had committed educational malpractice in failing to teach and to supervise. That claim, brought against a program by a resident who was himself being sued for malpractice, was denied.[26] However, in two cases, liability for the negligent actions of residents was attributed to programs that failed in their duty to supervise residents properly and not to supervising physicians.[27] In neither did the court label this failure educational malpractice; but in both, a breach of the duty of the program to teach and to supervise residents was found to be the direct cause of an injury. In a third case, a department chairman was at fault for not establishing appropriate standards for supervision and evaluation of residents.[8] Claims brought as a failure to supervise by a program or faculty member may have the same net effect as a claim for educational malpractice. However, this blurring of the distinction between negligence in supervision of trainees and educational malpractice may be offset by the fact that a claim for negligent supervision is limited to the duration of a resident's training program, whereas a claim for educational malpractice would extend without limit.

Malpractice litigation raises issues for the administration of residency training programs. The significance of a program's failure to provide adequate supervision or education has been discussed previously in several cases. The level of administration at which responsibility for supervision should be assigned has also been addressed by the courts. One case alleged the malpractice to be attributable to a failure by the State Board of Regents to limit the scope of practice and responsibilities assigned residents.[9] In a second, a department chairman was found to have failed in his duties to provide adequate supervision and to develop adequate procedural guidelines for the residents in the program, thus becoming the cause, in fact and proximately, of the resultant injury to the patient.[8] Most commonly, however, cases focus on the immediate supervision provided by the physicians in charge, the hospital as the residents' employer, and the appropriate allocation of authority and responsibility for actions taken by the resident between these two primary parties. The finding that almost 40% of the cases identified by this study decided questions of allocating responsibility for the duty of care and failure to supervise emphasizes the importance of setting policies that clearly delineate for faculty levels of supervision and responsibilities for supervision. The previously cited potential for legal difficulties arising from the team approach to patient care is thus confirmed by the caselaw in this review.[5]

Several cases identified prototypical problems of programs using two or more hospitals as training sites for their residents.[28] These problems often become particularly difficult because of cooperative arrangements between affiliated hospitals and programs. In suits involving public and private entities, the nongovernmental affiliate may become the "deep pocket" for malpractice claims that exceed the statutory limits of liability protecting public hospitals and programs, or when the private institution seeks protection under the umbrella of sovereign immunity. These disputes may be initiated by the insurance carrier after an accident has occurred, liability has been assigned, and indemnification has been sought by the program or hospital from the insurer. More typically, these suits seek simply to widen access to a "deep pocket" by establishing dual responsibility for malpractice by a resident between the program and the affiliated hospital through a close reading of affiliation agreements. Cooperative arrangements between institutions involved in residency training require ongoing review and monitoring to ensure compliance with the provisions of the affiliation agreement and prompt identification, reporting, and handling of incidents that do occur.

Over the study period the courts have substantially revised their interpretation of the law in the area of standards of care. The general trend of requiring all physicians to conform to national norms of practice is reflected in the results reported for supervising physicians. However, the application of that standard specifically to residents does not appear to have had adverse results or decreased their success in defending such cases. In part, however, this may be due to the courts' aggressiveness in ensuring that supervising physicians exercise direct control over the care delivered to patients by residents.

Similarly, the courts have generally sustained residents, who, as members of a team, obtained consent to perform a procedure upon patients. Relatively few cases focused on this issue were reported despite the attention paid to this problem in the literature.[29] In the only case to find inadequate consent, the supervising physician, not the resident, was found to be liable.[30]

In summary, this research on litigation affecting residency training programs confirms and expands the literature describing issues in medical malpractice in several ways. First, the frequency of malpractice litigation involving residents would appear to conform to general malpractice trends nationally. Second, a substantial proportion of the litigation focused on issues related to allocation of responsibility between hospital and responsible faculty for substandard care provided by a resident no matter what the cause. Finally, a significant group of cases identified reflects the complexity of the contemporary legal environment in which training programs operate. These issues include the complex institutional arrangements between participating organizations as well as state law requirements protecting public programs and limiting access to the courts. The growing exposure of programs of graduate medical education to malpractice litigation requires proactive communication between physicians, administrators, and legal counsel, as well as continued efforts at the state level to effect tort reform.

The authors thank William Hesson, Senior Assistant Director, University of Iowa Hospitals and Clinics, for his thoughtful and perceptive review of the manuscript.

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Publishing Services: Hanley & Belfus, Inc.
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Comparing Postgraduate Medical Education at University and Non-university Hospitals in Japan

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MINORU YAMAKADO, M.D., Dr.Med.Sc., OSAMU NISHIZAKI, M.D.,
TAKESHI OGATA, M.D., and KIYOTAKA SEGAMI, M.D.

Abstract—In 1988 the authors surveyed all the teaching hospitals in Japan to evaluate the present status of postgraduate medical education (PGME); they received responses from 67 (84%) of the university and 172 (89%) of the non-university teaching hospitals. It was found that a large proportion of residents had spent two years in a residency without having had a single experience of some of the basic clinical skills. Consequently the residents' confidence in their abilities to perform these skills was low. The residents at the university hospitals, in particular, had had fewer experiences and were less confident about their clinical skills than were the residents at the non-university hospitals. The lack of standard and minimum requirements for PGME in Japan may be the cause of the poor level of acquisition of clinical skills of residents during PGME. Other possible causes are the tendency in Japanese medical society to attach greater importance to academic attainment than to clinical competence and the excessive gravitation of residents toward university hospitals. The authors suggest their results show the necessity to improve the training in basic clinical skills in PGME in Japan, especially in university hospitals. *Acad. Med.* 67(1992):54–58.

The current Japanese postgraduate medical education (PGME) system was established in 1968 under the revised Medical Practitioners Law. Although not obligated to do so, medical graduates are recommended to spend two years in postgraduate clinical training at teaching hospitals. These hospitals are classified into two groups, university hospitals and non-university hospitals. The latter are those authorized by the Ministry of Health and Welfare as postgraduate clinical teaching hospitals. Under the current system, more than 80% of all medical graduates enter a clinical training course,[1] thus making PGME an essential part of the system of medical education. Therefore, PGME has a tremendous influence on the national supply of physicians through influencing the current and future clinical skills of individual residents. However, no nationwide survey of PGME has been carried out since the current system was established.

In our previous studies, which surveyed a small number of hospitals, we found remarkable differences between university hospitals and non-university hospitals in terms of patients' lengths of stay,[2] medical costs for the same clinical problems,[3] and the ways residents spent their time on a weekly basis.[4] We also found that the hospitals lacked methods to evaluate the achievements of individual residents as well as the PGME system as a whole.[5] We believe this lack of evaluation methods is the main problem of PGME in Japan, necessitating further analysis in this regard.

Based on our preliminary findings, in 1988 we conducted a large-scale survey of all the teaching hospitals. The purposes of the survey were to obtain basic information about the present status of PGME and to find ways to improve the system. The survey was specifically designed to examine the differences between university hospitals and non-university hospitals that had been found in our preliminary studies.

Method

A set of questionnaires was sent to each of the postgraduate teaching hospitals (80 university hospitals and 193 non-university hospitals) in February 1988. Among the postgraduate teaching hospitals, the branch hospitals of medical schools and psychiatric hospitals were excluded in order to maintain generalizability of the study.

Questionnaire

The questionnaire was designed to analyze the structure, process, and outcome of PGME and consisted of the following three parts: (1) hospital statistics pertaining to number of beds, death discharge rate, medical personnel, etc.; (2) structure and process of PGME concerning goal and curriculum, clinical conferences,

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commitment of residents in clinical practice, system of evaluation of residents, moonlighting, etc.; and (3) outcome of PGME regarding the residents' experiences and achievements of 13 items of basic clinical skills.

The first two parts were answered by the senior physicians in charge of PGME at each hospital and the last part by one-fifth of the second-year residents (every fifth resident on the list) at each hospital. Extracting from the items of our previously reported studies on the experiences and achievements of residents,[6–8] we used the residents' self-assessments regarding 13 clinical skills to evaluate the outcome of PGME. The numbers of experiences during the nearly two years of residency and the extents of the confidence of the residents for the 13 skills were self-reported; the residents rated their confidence pertaining to their performances of each skill on a scale of 1 to 4, with 1 designating no confidence and 4, complete confidence.

Analysis

The responses to the questionnaire were analyzed to compare PGME at university hospitals and non-university hospitals. Proportions were calculated for nominal scale and medians for numerical scale. Statistical analyses were performed using the chi-square test for categorical variables and Wilcoxon's rank-sum test for numerical variables. The numbers of experiences and the residents' self-rating scores of achievement of clinical skills were compared between the residents at university hospitals and those at non-university hospitals. Because of the increasing interest in evaluating PGME in Japan, we analyzed separately the responses to the questions relating to the evaluation of residents.

Results

After repeated solicitation, questionnaires were recovered from 67 university hospitals (84%) and 172 non-university hospitals (89%).

Table 1

Average Values for Questionnaire Items Comparing University and Non-University Hospitals in Japan Regarding Both Hospital Statistics and Teaching Conditions, 1988*

	Average Values	
	University Hospitals ($n = 67$)	Non-University Hospitals ($n = 172$)
Hospital Statistics		
Patients		
Number of inpatients/day	674	432
Number of inpatients/physician	3.00	7.45
Length of stay	38 days	29 days
Death discharge rate	5.84%	5.96%
Autopsy rate	40.25%	28.15%
Ambulatory patients per day	1,270	973
Staff		
Number of physicians	251	65
Number of senior physicians	156	30
Number of nurses	456	284
Number of nurses/physician	1.93	4.47
Teaching Conditions		
Residents and staff		
Number of residents	98	12
Number of physicians/resident	3.36	7.40
Number of senior physicians/resident	2.39	3.55
Number of nurses/resident	5.85	32.16
Duties (residents of internal medicine)		
Emergency room night duty/year	40	40
Average number of inpatients/year	82	132
Stipend per year		
First-year residents	1,386,000 yen	2,726,000 yen
Second-year residents	1,462,000 yen	3,323,000 yen
Medical library		
Medical journals (domestic)	626	86
Medical journals (international)	677	82
Number of librarians/physician	0.05	0.02
Academic activities		
Presentation of papers/resident/year	0.56	0.63

*The authors surveyed all the teaching hospitals in Japan to evaluate the present status of postgraduate medical education (PGME) and to compare such education at university and non-university hospitals; they received responses from 67 (84%) of the university and 172 (89%) of the non-university teaching hospitals. Under the current system, medical graduates are recommended — but not obligated — to spend two years in postgraduate clinical training at teaching hospitals; more than 80% of all graduates enter a clinical training course, thus making PGME an essential part of the Japanese system of medical education. In the table, the differences between the values of university hospitals and non-university hospitals are statistically significant ($p < .001$) except those regarding "Emergency room night duty/year" and "Presentation of papers/resident/year."

Comparisons

Our results concerning the comparison of PGME at university and non-university hospitals (Tables 1 and 2) are reported in the following four sections: hospital statistics, structure and process of PGME, evaluation of residents, and outcome of PGME.

Hospital statistics (Table 1). The

Table 2

Percentages of University and Non-University Hospitals That Responded Yes to Questionnaire Items Regarding Postgraduate Medical Education in Japan, 1988*

Questionnaire Item	% University Hospitals ($n = 67$)	% Non-University Hospitals ($n = 172$)
Status and condition		
Open selection of residents†	61.3	70.0
Social security for residents	71.4	94.3
Prohibition of moonlighting		
First year	57.4	87.0
Second year	43.6	81.2
Teaching program		
Goal and curriculum	82.8	75.2
Record of training	44.8	35.6
Evaluation of residents		
General	58.1	54.3
By supervisor	35.9	41.6
By self	4.7	19.9
Medical library		
Centralized medical record keeping	60.9	81.3
On-line information services	98.4	16.9
Duties in ambulatory care (residents of internal medicine)	19.3	67.8
Decision by residents regarding:		
Admission	1.6	21.8
Discharge	0.0	15.7
Workup plan	5.2	36.2

*The authors surveyed all the teaching hospitals in Japan to evaluate the present status of postgraduate medical education (PGME) and to compare such education at university and non-university hospitals; they received responses from 67 (84%) of the university and 172 (89%) of the non-university teaching hospitals. Under the current system, medical graduates are recommended — but not obligated — to spend two years in postgraduate clinical training at teaching hospitals; more than 80% of all graduates enter a clinical training course, thus making PGME an essential part of the Japanese system of medical education. In the table above, the differences between the values of university hospitals and non-university hospitals are statistically significant ($p < .001$) except those regarding "Open selection of residents" and the six items under "Teaching program."

†Open selection of residents versus selection restricted to graduates of certain universities.

mean length of stay of patients at university hospitals was approximately ten days longer than that at non-university hospitals. Although the mean total number of inpatients was larger for university hospitals than for non-university hospitals, the opposite was true for the mean number of inpatients per physician. Death discharge rate, which reflects severity of diseases, was higher for non-university hospitals than for university hospitals. University hospitals had more than twice as many physicians and supervisors (defined as physicians with ten or more years of clinical experience) and almost twice as many nurses as non-university hospitals, whereas the nurse-to-physician ratio was higher for non-university hospitals.

Structure and process of PGME. The university hospitals had fewer physicians, supervisors, and nurses per resident than did the non-university hospitals (Table 1). The residents in internal medicine at the non-university hospitals took care of more patients (Table 1); the residents in all specialties at the non-university hospitals had more chances to decide whether or not to admit or discharge patients and had more chances to plan the workups of inpatients (Table 2). No significant difference was observed for the numbers of papers read by residents in academic meetings (Table 1). The residents at non-university hospitals were better paid (Table 1) and less frequently allowed to engage in moonlighting (Table 2). Between university hospitals and non-university hospitals, there were no significant differences in the proportions of hospitals that had their own teaching goals, curricula, and records of training for residents (Table 2). On the one hand, the numbers of medical librarians per physician, the numbers of medical periodicals to which the libraries subscribed (Table 1), and the proportions of hospitals equipped with on-line information systems (Table 2) were much larger for university hospitals than for non-university hospitals. On the other hand, a centralized medical-record-keeping system had more frequently been adopted at non-university hospitals (Table 2).

Evaluation of residents (Table 2). The majority of the hospitals claimed that they had a system of general evaluation of achievement by residents. The proportion of positive responses, however, was smaller for the detailed questions regarding the standard procedure of evaluation. For instance, the proportion of hospitals of both types combined that conducted systematic evaluation by supervisors was 40% and that by residents themselves was 15.7%. There was virtually no difference in the proportions of hospitals with systems of general evaluation between the university hospitals and the non-university hospitals.

Outcome of PGME. It is noteworthy that the proportions of residents who had never experienced the basic clinical skills listed in Table 3 are quite high. In general, the residents at the non-university hospitals experienced these skills more frequently. In particular, these residents had more chances to take care of patients with common diseases (such as acute gastroenteritis) and to perform basic diagnostic skills (e.g., lumbar puncture) and treatment procedures (e.g., tracheal intubation). Corresponding

Table 3

Percentages of Residents with No Experience of Performing Basic Clinical Skills and Percentages of Residents Confident of Their Skills at University and Non-University Hospitals in Japan, 1988*

	% Residents with No Experience		% Residents with Confidence	
Clinical Skills	At University Hospitals	At Non-University Hospitals	At University Hospitals	At Non-University Hospitals
Differential diagnosis of arrythmia	2.8	2.4	29.6	31.0
Microscopic examination of urine	38.4	29.4	22.5	24.0
Care for acute gastroenteritis	14.6	8.8	18.2	29.3
Lumbar puncture	15.5	11.4	33.5	44.7
Cross-match for blood type	19.1	22.4	48.1	40.5
Arteriocentesis	2.8	1.0	82.1	90.0
Tracheal intubation	19.9	10.8	41.1	58.1
Incision of abscess	33.3	30.4	28.0	26.0
Interpretation of renal angiography	43.3	40.8	5.8	10.7
Digital examination of prostate	44.5	27.9	6.6	7.3
Operating x-ray equipment	66.7	71.9	8.6	8.3
Fundoscopy for atherosclerosis	38.5	37.7	8.6	4.8
Examination of tympanic membrane	68.0	59.0	6.1	5.9

*The authors surveyed all the teaching hospitals in Japan to evaluate the present status of postgraduate medical education (PGME) and to compare such education at university and non-university hospitals; they received responses from 67 (84%) of the university and 172 (89%) of the non-university teaching hospitals. As part of the survey one-fifth of the second-year residents at each hospital (359 residents from university and 298 from non-university hospitals) completed self-assessments pertaining to 13 clinical skills. The residents reported the number of experiences they had of each clinical skill during their nearly two hears of residency and the extent of confidence they felt regarding each of the 13 skills according to the following scale: 1 = unable, 2 = capable under instruction, 3 = nearly capable without instruction, and 4 = fully capable. Only ratings of 4 were counted by the authors as constituting confidence.

to their greater degree of experiences, the residents at the non-university hospitals seemed to be more confident about their clinical skills (Table 3).

Discussion

This was the first nationwide study of PGME in Japan since the current PGME system was established in 1968. The major change made in 1968 was the abolishment of internship and the introduction of two years of residency training, which, however, is not mandatory. During undergraduate medical education, students are not allowed to experience medical practice firsthand. Once they pass the national board examination after graduation, they are fully qualified to perform any medical practice on their own without being required to have any formal training. Currently, 80% to 90% of the graduates receive clinical training within the PGME system[1] and most of the remaining graduates are believed to have some clinical experience outside the system. The problem with current PGME is that there are neither standard nor minimum requirements.[8] This may be the cause of the relatively poor achievement (although the variation was tremendous) of clinical skills and knowledge of residents during PGME. Consequently, many physicians were poorly trained in basic clinical skills even after two years of residency, as shown in Table 3. Most of the clinical skills listed in Table 3 are the kinds required from the very beginning of primary care practice, so the results may reflect the level of Japanese primary care.

In comparing the two types of hospitals (university and non-university), we found remarkable differences in various indices related to PGME. The residents at non-university hospitals, in particular, had more experience and were more confident about their clinical skills compared with the residents at university hospitals. Similar findings[10] have been reported by Yamane and Ogasawara, who investigated residents in internal medicine in selected hospitals.

One of the major differences between the university hospitals and the non-university hospitals was the difference in the sizes of the institutions. Generally, the university hospitals were larger in terms of the numbers of patients and staff members. When divided by the number of residents, however, these numbers became smaller. This indicates that the larger numbers of medical staff and patients at university hospitals were surpassed by the gravitation of residents toward university hospitals. This gravitation may well have been the cause of the relatively fewer chances for clinical experiences available to the residents at university hospitals.[11,12]

In Japan, a hierarchical medical care system has not been clearly established. There is a tendency, however, for university hospitals to deal more with tertiary care, while some non-university community hospitals deal mostly with primary care. The different roles in the medical care system also determine the indices related to PGME.[13] Because of the lack of practical experience during undergraduate medical education in Japan, the primary purpose of residency is to provide opportunities to learn and experience the basic clinical skills and acquire the clinical knowledge needed by all clinicians.[9,14] However, there is a tendency in Japanese medical society even during residency to attach greater importance to experiences of rare diseases, the newest medical technologies, and the latest knowledge.[12] These purposes may be attained more effectively at university hospitals than at non-university hospitals, and this is one of the causes for the gravitation of residents to university hospitals. The power of professors in university hospitals to allocate physicians to many large hospitals may be another reason. As a consequence, residents prefer to stay in university hospitals after their graduation, seeking better positions rather than clinical competence.

We had a tentative hypothesis that non-university hospitals, which provide better opportunities for the training of residents, also had more comprehensive evaluation systems. The results of the present study, however, did not support such a hypothesis. We found no difference in the proportions of hospitals with an evaluation system between the university hospitals and the non-university hospitals. This finding was confirmed by a multidimensional analysis, controlling for confounding by other variables (details of this analysis are available from the corresponding author, E.Y.). However, the limitation of our questionnaire method for the assessment of the extent of evaluation systems may have affected the result. Another possibility is that when we began our study some non-university hospitals well known both for their good PGME programs and for their evaluation systems may have seemed more representative of the non-university hospitals than they really were.

In interpreting the results of the present study, several precautions are necessary because of the unique characteristics of the Japanese PGME teaching hospitals and the limitation of the study. First, the interdepartmental heterogeneity of the university hospitals may have greatly affected the responses from those hospitals. University hospitals have many departments, which are in most cases quite independent of each other. Although a senior physician in charge of PGME at each hospital was requested to answer the questions, the answers to some questions, may not have represented the hospital as a whole. The relatively lower response rate of the university hospitals suggests the difficulty of conducting surveys of these hospitals.

Second, there are problems related to the self-evaluation of achievement by the residents. Being a subjective judgment, self-evaluation may be influenced by personal character; some residents may have been overconfident about their skills, and some may have been so modest that they underestimated their abilities. In our previous studies,[6,7] we found a positive correlation between residents' numbers of experiences of performing clinical skills and their confidence in their abilities. This, however, does not guarantee the validity of the present study. Because of the lack of an objective nationwide standard, the results of the self-evaluation of achievement by the residents need to be interpreted with caution.

In spite of these weaknesses, our study provides important information regarding current Japanese PGME, suggesting the necessity to improve the training in basic clinical skills in PGME.

The authors thank Dr. James R. Langworthy of Straub Hospital (Hawaii) for his valuable comments. This study was funded by the Japan Medical Education Foundation and the Foundation of Daiwa Security Corporation.

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A3273-8

FEBRUARY 1992

ACADEMIC MEDICINE

JOURNAL OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

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National Health Care and Academic Medicine

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

FEBRUARY 1992
VOLUME 67
NUMBER TWO

ACADEMIC MEDICINE

JOURNAL OF THE
ASSOCIATION OF
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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; $130/2 years; $185/3 years; and $7.00 per single copy.

Subscriptions received before June 30 will be honored for the calendar year: (January through December). Issues from January up to receipt of first issue of new subscription will be mailed automatically.

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Advertising: Diane Sherel, Advertising Manager, Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, PA 19107; (215) 546-0313.
Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
Cancellations of an *Academic Medicine* subscription must be submitted in writing to Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037. Claims for back issues will be honored for only the three months before the cancellation.
Reprints: Request reprints directly from the authors of articles, not from *Academic Medicine*.
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ROBERT G. PETERSDORF, M.D.

Not a Choice, an Obligation

Abstract—The author traces the gradual increase of educational opportunities for underrepresented minorities that began in the mid-1950s and indicates the role played by the Association of American Medical Colleges (AAMC) and individual medical schools in the 1960s and 1970s to increase minority enrollment in medical schools. Minority enrollment did grow dramatically for awhile, but since 1974 the nationwide percentage of minority students enrolling has remained about the same despite the rising percentage of minorities in the population (although some individual schools have recruited and graduated relatively large numbers of minority students). The author then emphasizes how crucial to the nation's future it is to reverse this trend and achieve equity of opportunity for minorities by enhancing their educational opportunities. He maintains that academic medical centers must become involved in identifying and assisting capable minority students well before they are potential applicants to medical school, thereby helping to enlarge the pool of academically qualified minority applicants rather than relying on more aggressive recruitment from the existing small applicant pool. Enlarging the minority applicant pool is the cornerstone of a new AAMC campaign nearly to double the number of underrepresented minority matriculants by the beginning of the next decade: *Project 3000 by 2000.* The short-term and long-term strategies of this campaign are described; it focuses on creating partnerships with high schools and undergraduate colleges and will be based in part on a variety of existing and successful efforts of this type being made by individual medical schools, private foundations, and the federal government. The author closes by asserting that to better educational opportunities for minorities is not a choice; it is an obligation. *Acad. Med.* 67(1992):73-79.

I invite you to indulge with me in a bit of reminiscing back to the 1950s, when I and perhaps many of you reading this article laid the foundations of our professional careers. In the postwar boom economy, our future possibilities seemed endless, limited only by our ambitions and talents. It is no wonder that I remember the 1950s as the "good old days." Obtaining what you wanted — whether it was a house or a college education — seemed to be within reach if you worked hard and played it smart — especially if you were white.

It is no secret that the 1950s were not such a favorable time for minority citizens. Oppressive laws and a long and continuous tradition of racial prejudice restricted educational opportunities for minorities. This began to change very slowly with the watershed Supreme Court decision of Brown v. Board of Education in 1954. In that era, the medical profession was not significantly different from the rest of society in the restrictions it placed on minorities.

A slightly different version of this article was presented on November 10, 1991, at the plenary session of the 102nd Annual Meeting of the Association of American Medical Colleges, in Washington, D.C.

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During the 1950s and 1960s, when 10% of the total population was black, only 2.2% of all physicians in the United States were black. The number would have been much smaller had it not been for the good work being done at Howard and Meharry, where, until the mid-1960s, three-fourths of all black doctors were educated. Mexican-Americans, mainland Puerto Ricans, and American Indians, who together made up about 3% of the U.S. population in the mid-1960s, constituted less than .2% of total medical school enrollment.

Paralleling what was happening in the rest of society, awareness of the injustice of unequal opportunity in medicine grew during the period of the civil rights movement in the early and mid-1960s. At that time, medical schools began actively to recruit underrepresented minority students—principally blacks—and lively discussions took place about what action the Association of American Medical Colleges (AAMC) should take. A task force was created and subsequently issued a report calling for an increase in first-year underrepresented minority enrollment to 1,800 by 1976. This number, the equivalent of 12% of the first-year class, corresponded to what was then believed to be the percentage of the four underrepresented minority groups in the population at large.

Tremendous progress was made in improving opportunities for minority students to study medicine during the early 1970s. This was largely attributable to the leadership of many people and institutions within the academic medicine community, supported by strong programmatic initiatives by the AAMC.

By 1974, first-year underrepresented minority student enrollment had risen to nearly 1,500, or 10% of the entering class (see Figure 1). Yet, despite the hard work of many in the academic medicine community, the enrollment goal of 12% underrepresented minority enrollment projected for 1976 was not met (Figure 2). In fact, today, 15 years later, the percentage of underrepresented minorities in the first-year class remains 10%.

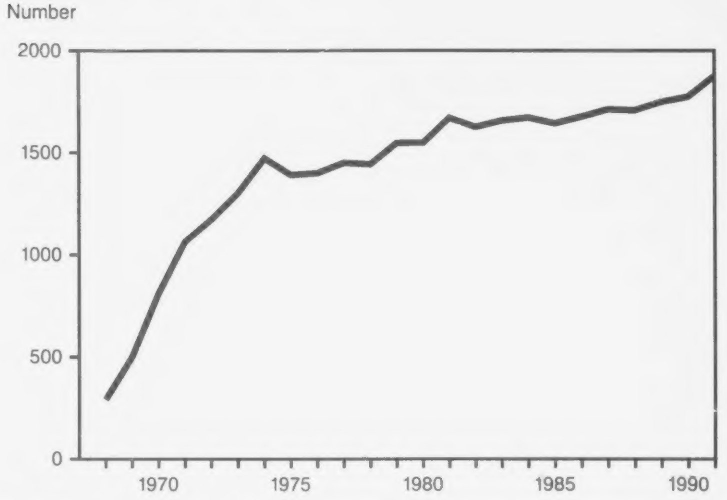

***Figure 1.* Numbers of minorities enrolled as first-year medical students, 1968–1991.**

This plateau in enrollment is even more disturbing than it may at first appear because of continuing growth in the nation's underrepresented minority population. The chances for underrepresented minority students to be admitted to medical school have actually become more remote as their proportion of the total U.S. population continues to rise. Not only have we not made any progress toward our goal of providing equitable access to medical school for students from all segments of society, since the mid-1970s, we have been losing ground.

Current Programs

The current stagnation in enrollment has occurred despite a substantial commitment to minority recruitment

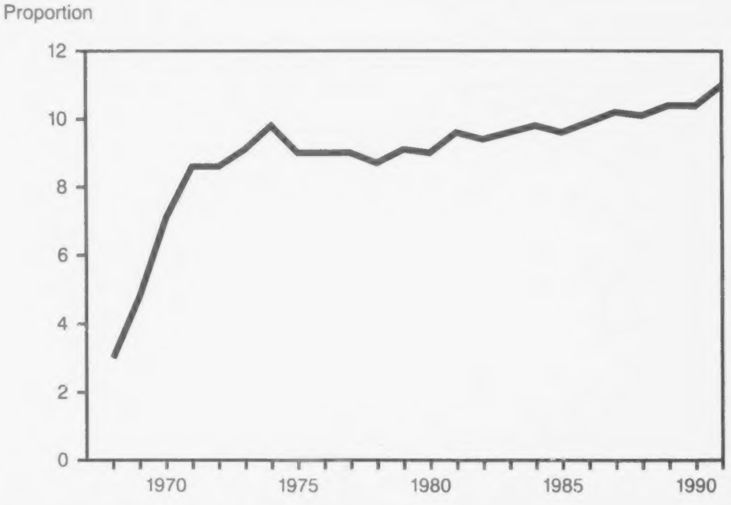

***Figure 2.* Underrepresented minorities as a proportion of first-year enrollments, 1968–1991.**

by many schools. In 1991 the AAMC conducted a survey of minority-related programs, to which 101, or 80%, of the schools surveyed responded. Eighty percent of the responding schools had designated one individual as the chief minority affairs officer. Eighty-eight percent of the schools had developed and implemented some type of recruitment or enrichment program to increase the number of underrepresented minority students. The AAMC has found that both of these characteristics are positively related to minority enrollment.

Table 1

The Changing Nation*

Group†	1990 No.	1990 %	% Change 1980-1990
White	199,686,070	80.3	+6.0
Black	29,986,060	12.1	+13.2
Mexican-American	13,495,938	5.4	+54.4
Puerto Rican	2,727,754	1.1	+35.4
Other Hispanic	5,767,247	2.3	+59.0
American Indian	1,959,234	0.8	+37.9
Asian/Pacific Islander	7,273,662	2.9	+107.8
Other	9,804,847	3.9	+45.1
Total U.S.	248,709,873	100	+9.8

*Source: U.S. Census

† Respondents of any group may have classified themselves as Hispanic.

While some schools may need to do very little to enroll relatively large numbers of very capable minority students, others invest a great deal of energy not only in recruiting from the existing applicant pool, but also in developing the skills of college and high school students — thereby expanding the size and improving the quality of the pool.

It is clear that many of our schools are working hard on this issue. In some cases these efforts have succeeded in producing large numbers of underrepresented minority graduates; in others, they have not. However, there are still some schools that have not given this issue a high priority, and their production of underrepresented minority graduates reflects this lack of commitment. It is fair to say that the schools that have been successful in producing relatively large numbers of underrepresented minority graduates have benefitted from strong commitment to minority recruitment by their leadership. The fact that underrepresented minority student enrollment has not substantially increased since 1974 sends us a clear message that something more — or something different — needs to be done.

Education and Racial Inequality in the 1990s

At this point, we need to address two central questions: First, what action can we take that would significantly increase the number of underrepresented minority medical students, and second, why is this so important?

The principal reason this issue is so important is, simply stated, the necessity for equity. In recent years, American society has become increasingly polarized by race. This dangerous trend has occurred at the same time that our country is becoming more heterogeneous in its racial and ethnic composition (see Table 1). In the 1950s nearly nine of every ten Americans were of white European descent. Today, one-fourth of us — and one-third of our children — are of African, Latin American, or Asian origin. Increases in the numbers of Mexican-Americans, blacks, American Indians, and mainland Puerto Ricans account for the vast majority of this increase in the underrepresented minority population. The rate of poverty for these groups, particularly for the children, is alarmingly high. Can we honestly say that these young people, whose success is critical for America's future, have the same chance to achieve in our society as most white children?

Today, unlike the pre-civil rights era, the formal laws limiting educational and professional opportunities for non-white Americans are gone, and overt displays of racial discrimination are much less common than in years past. Today, the major barrier to success is lack of education.

In our professional role as physicians and medical educators, it may seem that our principal contribution to alleviating the societal ills of poverty and lack of opportunity may lie in the provision of medical care for the indigent, a commitment undertaken by most teaching hospitals and many teaching physicians. I am convinced, however, that in addition to this, there is a role for academic medical centers in combatting the growing disparities between rich and poor. I believe we must also become involved in developing creative new ways to enhance educational opportunities for minority and economically disadvantaged youngsters in our communities.

In discussing these problems, it may seem that I have strayed from the issue of increasing underrepresented minority student enrollment — but I have not. We are in the unfortunate situation today that medical schools find themselves competing for the same small pool of academically qualified minority applicants. We cannot produce underrepresented minority medical students if there is an insufficient number who are applying to our schools, graduating from college, or even finishing high school with sufficient skills to enable them to survive a premedical course of study.

The Pipeline to Medical School

Increases in the enrollment of minority medical students of the magnitude needed can occur only with substantial growth in the size and enhancement in the quality of the applicant pool. This will not be accomplished without greater programmatic emphasis during the high school and early undergraduate college years. A

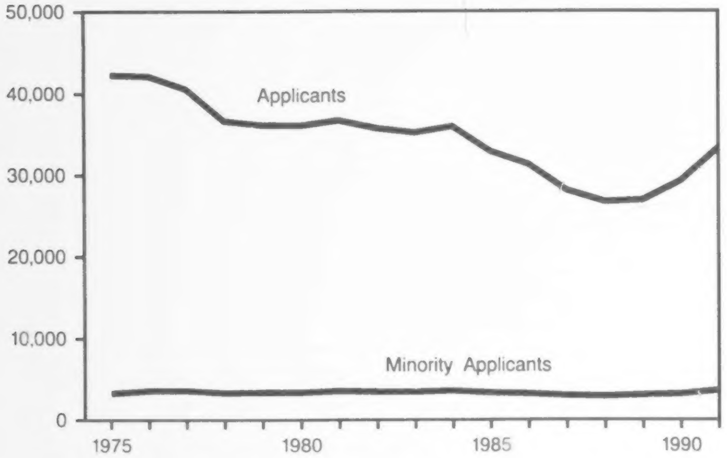

Figure 3. **Numbers of medical school applicants, 1975–1991.**

brief review of the data demonstrates that there are still steps that can be taken at every stage along the educational pipeline that will increase underrepresented minority student enrollment.

As examples, let us consider three stages of the pipeline to medical school: (1) applications made and acceptances offered; (2) the ratio of science graduates to medical school applicants; and (3) academic preparedness for science study.

Applications Made and Acceptances Offered

An examination of applicant trends shows that between 1975 and 1988, when the total number of applicants to medical school fell by 37%, the number of underrepresented minority applicants was relatively stable, and their percentage in the applicant pool rose from 8.7% to 9.4% (see Figure 3). The stability in the total number of minority applicants during this period is disappointing, given the substantial amount of work that had gone into recruiting such students and given their increase as a percentage of the total population of 22-year-olds.

In 1975, 41% of minority applicants were accepted, compared with 39% of all applicants. In 1990, 51% of minority applicants were accepted, compared with 59% of all applicants. In other words, in 1975, underrepresented minority applicants were slightly more likely to have been offered acceptances than were other applicants. Today, the situation has changed, and the acceptance rate for minorities, relative to all other applicants, has been declining. This decline in the rate of acceptance relative to that of other applicants has occurred even though the difference in Medical College Admission Test (MCAT) scores between minority and majority applicants has been steadily narrowing.

Table 2

The Number of College Science Degrees Compared with the Number of Medical School Applicants, 1987

Applicant Group	College Graduates with Science Degrees	Medical School Applicants	Ratio of Science Degrees to Applicants
White	48,438	20,328	2.4 : 1
Black	2,776	2,203	1.3 : 1
American Indian	221	123	1.8 : 1
Hispanic	1,682	1,175	1.4 : 1

These data are noteworthy from two points of view. First, the overall lack of growth in the number of minority applicants and the fact that minority applications as a percentage of total applications have not reached the 1976 goal of 12% are discouraging. Second and even more discouraging is the falling acceptance rate for minorities relative to the majority, despite improvement in the academic credentials of minority applicants. These observations mandate that we take another look at the admission process.

Ratio of Science Graduates to Medical School Applicants

Although we encourage students with undergraduate studies in the arts and humanities to apply to medical school, three-fourths of all applicants and matriculants have earned bachelor's degrees in the sciences. Bearing this in mind, it is instructive to compare the number of black, Hispanic, and American Indian graduates in the sciences with the number of medical school applicants.

As Table 2 shows, medical schools are already receiving the lion's share of scientifically trained bachelor's-degree holders. This is especially true for minorities. That so many of the available minority science graduates apply to medical school is to no small degree testimony to the effectiveness of the recruitment programs that we administer. While we cannot afford to diminish our efforts to recruit minority college students to medical schools and to assist them when they are accepted, we must also recognize that recruitment and enrichment programs for college students have been the primary focus of our efforts for the past 20 years, and that the likelihood of increasing the *percentage* of such students that apply to medical school is probably limited. A more promising approach is to increase the absolute *number* of college students that apply to medical school.

Academic Preparedness of High School Students for Undergraduate Science Studies

If we are to make the kind of enrollment gains that are needed, new strategies that concentrate on improving the academic preparation of younger students must be implemented. This can be demonstrated by examining results of the National Assessment of Educational Progress (NAEP) survey of the science skills of 17-year-olds, and data from the Scholastic Aptitude Test (SAT), which is administered to most college-bound high school seniors.

There is no shortage of minority young people interested in careers in medicine. Nearly 5.5% of black college freshmen select medicine as their first career choice, compared with 3.2% of white freshmen. Unfortunately, very low college completion rates for blacks and Hispanics in general, and difficulty with introductory science courses, in particular, cause many of these high school and beginning college students to leak out of the medical school pipeline.

Why are so many minority students dropping out of the medical school pipeline? Undoubtedly there are many reasons, including dwindling financial aid and perhaps a less-than-hospitable climate for minorities on many college campuses. As for those students who remain in college but drop out of premedical studies, many are victimized by poorly taught introductory science courses. It is my strong view, however, that the primary cause of attrition from the pipeline is poor academic preparation prior to college.

The NAEP is a Department of Education survey of American school children's knowledge of various academic subjects, including science and mathematics, and of their literacy skills. This survey shows that black and Hispanic school children have been doing a better job in recent years of learning basic facts and rudimentary skills in all subjects. Nevertheless, there has been no improvement in the percentage of minority high school seniors who have mastered the more advanced skills that are prerequisites to success in college.

A look at the science skills of 17-year-olds is instructive. According to the NAEP's findings in 1986, only .05% of blacks 17-year-olds were able to integrate specialized scientific information for use in problem solving —a prerequisite skill for college science courses.

Given that there are approximately 560,000 black 17-year-olds in the United States, and that the NAEP's findings indicate that as recently as 1986 only .05% were prepared to study science in college, that works out to only 2,800 individuals, which is slightly higher than the current number of black applicants to medical school. A review of SAT data leads to the same conclusion regarding the degree to which the pipeline to medical school is already narrowed for minorities by the end of high school.

We must conclude from these bodies of data that substantial increases in minority student enrollment cannot be attained solely through more aggressive recruiting from the existing pool of premedical students.

Recognition of the Need for Early Intervention

This conclusion, of course, is not new. In 1978, after it had become clear that the rapid rise of underrepresented minority student enrollment begun in the late sixties had stalled, the AAMC convened a second Task Force on Minority Student Opportunities in Medicine. Its principal recommendation was to increase the size and the quality of the minority applicant pool by identifying highly motivated and capable minority students well in advance of medical school application. Ideally, this would mean reaching back as far as the primary grades. Practically, for medical schools the recruitment of such students would require that each medical school develop "feeder systems" with high schools and undergraduate colleges in its geographic sphere of influence. Through such feeder systems, the medical schools could assist neighboring institutions to improve students' academic preparedness, counseling, tutoring, and access to reliable career information.

Unfortunately, this recommendation of the 1978 Task Force was not widely implemented. I believe that its implementation is what is most needed today, and we have made it the cornerstone of a new AAMC campaign nearly to double the number of underrepresented minority matriculants by the beginning of the next decade. We have named this campaign *Project 3000 by 2000*, in recognition of its primary goal to increase the number of underrepresented minorities entering the first-year class from its current level of approximately 1,600 to 3,000 by the beginning of the next century. This numerical goal is simply an updating to current demographic realities of the AAMC's commitment, first made in 1970, to equitable representation in medical school for students from all segments of society.

Project 3000 by 2000

Project 3000 by 2000 is based on the premise that academic medical centers are an integral part of the communities they serve. In the field of education this interdependence with the community has resulted in medical schools' expectations that local undergraduate colleges and state school systems would provide sufficient numbers of students with the skills necessary for medical study from all segments of society. Unfortunately, these educational advantages have not been bestowed on many minorities.

Given the pervasive nature of the educational disadvantages minorities must overcome, medical schools cannot single-handedly compensate for the poor schooling received by many minority students. A few weeks of remedial laboratory and classroom work prior to the onset of medical school cannot compensate for years of inferior schooling. This is not to say that all minority students suffer from inferior preparation, or that the academic enrichment programs we administer are not worthwhile. Obviously, neither is the case, but, it is equally obvious that not enough qualified minority students apply to medical school, and that inadequate academic preparation during high school and college has prevented many minority young people from gaining admission. What can we — as a community — do to remedy this situation? That is what *Project 3000 by 2000* is all about.

Short-term Strategies

To reach its goal, *Project 3000 by 2000* will utilize both short- and long-term strategies. One short-term strategy is to intensify efforts to recruit minority students already in college by expanding cooperation between medical schools and undergraduate colleges to coordinate curriculum and develop innovative admission agreements.

One good example of cooperation between a medical school and undergraduate colleges is Boston University School of Medicine's early medical school selection program. In this program, 12 students each year from historically black colleges are provisionally admitted to the medical school at the end of the sophomore year. Students are at the medical school that summer and return to their home institutions for the junior year, after which they return to Boston. During the senior year, the students take courses at both the undergraduate campus and the medical school, earning dual credit for the medical school courses they complete with at least a "B" average. A "B" average leads to automatic admission to the medical school.

This program "decompresses" the preclinical years, increases the level of awareness and interest in medicine among students at participating undergraduate colleges, allows students gradually to become acclimated to the rigors of medical school, and eliminates a certain amount of redundancy in the baccalaureate and medical school curricula.

Another short-term strategy involves identifying groups of college students who are being lost from the pipeline. For example, almost 200 minority students take the MCAT each year and score well enough to be admitted to medical school but do not apply. Moreover, about 75 minority students are admitted each year but do not matriculate. These are obvious sources of students to be targeted immediately by medical school recruitment and financial aid officials.

Long-term Strategies

Long-term efforts involve the identification or creation of magnet health sciences high schools with substantial minority enrollments. These high schools would then be encouraged to form partnerships with colleges and medical schools to create an integrated educational pathway.

In virtually every community where there is a medical school, the academic medical center is one of the most respected, influential, and economically important institutions in the area. The academic medical center is also home to a large number of scientifically trained professionals. Under these circumstances, the stage is set for the development of potentially productive partnerships between the local schools and the academic medical center. Throughout America corporate organizations have initiated activities to help public education. Why should academic medical centers not do so as well?

I am not proposing that medical schools get into the business of running high schools or trying to dictate educational policies to local school officials. I am proposing that each academic medical center become an advocate in its own community for the implementation of a rigorous academic curriculum in at least one magnet high school serving a predominantly minority population.

The first program of this type was developed in 1971 by the Baylor College of Medicine. Although the program was founded by Baylor, primary responsibility for the administration of the school is now, quite properly, in the hands of the Houston school system. Over the years, nearly one of every 20 graduates of Houston's High School for the Health Professions have become physicians or are now in medical school. Three-fourths of the graduates have pursued science or health-related degrees in college. In the last several years, Baylor has joined with school systems in two other Texas cities to replicate this model.

The Josiah Macy Jr. Foundation has developed several successful high school health sciences programs and has placed them within existing public schools in both urban and rural locations. All of the Macy schools benefit to some degree from collaboration with an academic medical center. Like those from Houston's High School of the Health Professions, graduates from the Macy programs go on to study at highly selective universities and are awarded a significant amount of scholarship money.

With the support of the National Science Foundation and private philanthropy, a new organization called Ventures in Education is working to disseminate the Macy model around the country. Its goal is to enroll 100 high schools by the end of this decade.

Johns Hopkins, the Charles R. Drew University of Medicine and Science, the University of Southern California School of Medicine, and the University of Missouri — Kansas City School of Medicine also are involved in partnerships with magnet high school health science programs.

In every case, the primary responsibility for instruction lies with the local school system. The medical center contributes one or several of the following: (1) curriculum planning; (2) supplementary learning experiences at the medical school or teaching hospital; (3) summer and after-school jobs; (4) teacher training; (5) participation in admission agreements linking high school health sciences to undergraduate colleges and the colleges to the medical school; (6) "tracking" of the academic progress of participants in magnet programs; and (7) "adopting" them as their medical students of the future.

The involvement of medical center

personnel in these programs is very important to low-income youths, who may not know any doctors or other professionals in their communities. Over half of all medical students, both minority and majority, say that they decided that they wanted to become a doctor before graduating from high school. It is essential that we nourish this aspiration.

Still other medical schools, including the University of California at San Francisco, the University of Kentucky, and the University of Texas Health Science Center at San Antonio, work to improve the quality of science education for minority and majority students at schools systemwide, rather than at a specific school. Typically, medical school faculty work with elementary and secondary science teachers in summer laboratory internships or teacher in-service training, and are involved in curriculum development. Medical schools may also assist by donating surplus supplies for use in science instruction.

With so much going on already, why aren't we making more progress with minority enrollment? Part of the problem is that many of these efforts are relatively new, and it is too early to see the results. Second, better articulation among the various programs in which we are involved is needed in order to attain the optimum results. Third, many activities are still not sufficiently rigorous and demanding in view of the many prior years of educational deprivation. Fourth, more medical schools need to get involved because there is so much work that needs to be done.

Conclusion

Academic medical centers can do a better job of improving educational opportunities for minority students and increasing minority participation in medicine by working in partnership with local school systems and undergraduate colleges.

We cannot afford to be overwhelmed by the magnitude of this challenge—as daunting as it may seem. Medical schools, the federal government, and private foundations, including The Robert Wood Johnson Foundation, The Henry J. Kaiser Family Foundation, the Josiah Macy, Jr. Foundation, and the Commonwealth Fund, already are spending a great deal of money on programs to increase minority enrollment. It may be that more money is not primarily the winning ingredient. Rather, what we need is to broaden our horizons, to look beyond the "lone ranger" programs that we sometimes congratulate ourselves for running. We must become more analytical in the way in which we assess the educational needs of minority students at each stage of the educational continuum, and design our strategies accordingly. The establishment of partnerships with high schools and undergraduate colleges that share with us the common goal of improving educational and career opportunities for minorities is a strategy that we need to pursue more aggressively.

Our record of stagnant minority enrollment over the past 15 years demands that we renew our commitment to equality of opportunity for all who wish to pursue a medical education. All of us must become involved in this campaign. Providing young people from all racial and ethnic backgrounds with the opportunity to study medicine is not a choice. It is an obligation.

I am grateful to Dr. Timothy Ready, Dr. Herbert Nickens, and Mrs. Kathleen Turner for valuable assistance in the preparation of this article.

SPECIAL ARTICLES

JAMES R. BOEX, M.B.A.

Factors Contributing to the Variability of Direct Costs for Graduate Medical Education in Teaching Hospitals

Abstract—Medicare's support of graduate medical education includes funds allocated to the direct costs of graduate medical education: housestaff stipends and benefits, faculty costs, and related educational costs such as classroom space. As reimbursed through the mechanism called the direct graduate medical education (DGME) pass-through, these direct costs have been reported to vary widely from one teaching hospital to another, with little explanation for this variation being available. Based on a national survey of 69 teaching hospitals—principally affiliated community teaching hospitals—the author suggests that a major cause for the variation in these costs might be found in their faculty-expenses component. It is further suggested that economies of scale may provide some clue as to the variability of these costs. The author also reports lower DGME costs for the survey sample than for the national sample, and suggests that the fact that community teaching hospital faculties include a significant volunteer component may account for some of these savings. *Acad. Med.* 67(1992):80–84.

As part of its overall goal of reducing health care expenditures, the federal government has targeted Medicare's support of graduate medical education (GME) as one area for special scrutiny and action.[1] Other third-party payers are also seeking to reduce or eliminate payments that support GME. Concern over the effects of such cutbacks on teaching hospitals' ability to provide appropriate graduate medical education opportunities has led educators, policymakers, and others to investigate both the direct and the indirect costs of GME.

The direct costs of GME include those that can be traced to educational cost centers; they are generally grouped into three areas: expenditures for housestaff stipends and benefits, faculty expenditures, and related educational expenses such as those for classroom space. These expenses are subsidized by Medicare through the mechanism of the direct graduate medical education (DGME) pass-through, subject to a number of restrictions. (The Consolidated Omnibus Budget Reconciliation Act of 1985—COBRA—among a number of restrictions and limitations, restructured the method of DGME reimbursement away from a strictly cost-based reimbursement method toward an institutional payment per full-time equivalent resident, based on 1984 costs.) Direct medical education expenses should not be confused with those that the Medicare Indirect Medical Education Adjustment (IME) helps offset, such as the clinical inefficiency of trainees and the higher intensity of care typically pro-

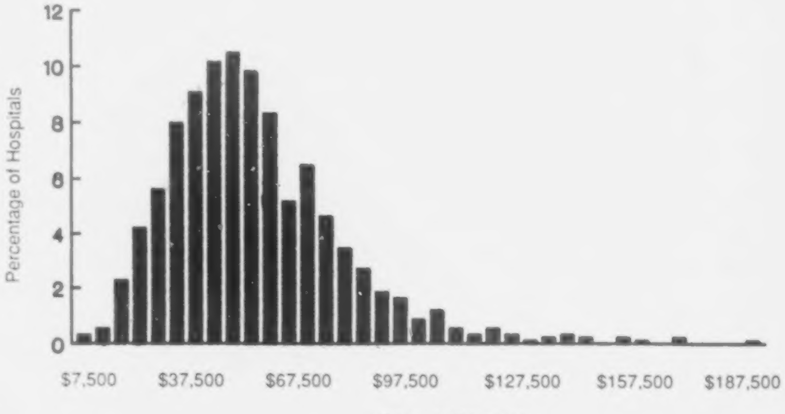

***Figure 1.* Distribution of U.S. teaching hospitals' costs per resident. (Source: Council on Graduate Medical Education (DHHS, HRSA), first report, July 1988, based upon C.B.O. tabulations of 1984 Medicare cost reports.)**

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vided by teaching hospitals. This paper deals with those activities reported and supported through the mechanism of the DGME. Medicare's expenditures for the DGME exceed $1 billion annually.[2]

In 1988, the staff of the Prospective Payment Assessment Commission (ProPAC) published in the first report of the Council on Graduate Medical Education (COGME) an analysis of data from 1984 Medicare cost reports, which showed that, on a per-resident basis, the direct costs of GME at the nation's teaching hospitals ranged from $7,500 to nearly $200,000, with a mean of $53,500.[3] The distribution of these per-resident costs is shown in Figure 1.

There is agreement that the very lowest per-resident expenditures reported probably occur because of the presence of funds that partially offset otherwise higher expenditures (such as funds that might be made available by state grants for primary care residency training), but beyond this, the causes for this wide range of costs have been widely speculated upon, with little specific analysis being published to date.

Table 1

Comparisons between AHME and COTH Members' Expenditures for, and Sources of, Residents' Stipends and Benefits, 1989–90

Postgraduate Year	Dollar Amounts of Stipends for First-, Second-, and Third-year Residents' Nationwide		
	AHME Mean*	COTH Mean†	% Difference
One	24,300	24,649	1.4
Two	25,870	26,222	1.3
Three	27,195	27,659	1.7

Benefit	Percentages of Hospitals Providing Each of Seven Benefits	
	AHME Hospitals*	COTH Hospitals†
Hospitalization	100	100
Dental services	90	77
Prescription drugs	90	90
Life insurance without charge	77	74
Disability insurance without charge	72	64
Psychiatric support without charge	82	58
Meals without charge when working or on call	94	92

Source	Percentages of Funding for Residents' Expenses, from Each of Seven Sources		
	AHME Members*	COTH Major Affiliates†	COTH Limited Affiliates†
Patient-care revenues	90.4	82.1	93.7
State and/or municipal funds earmarked for GME	4.9	9.3	3.3
VA appropriations	0.0	0.6	0.8
Physician fee revenues	1.0	0.8	0.1
Medical school funds	0.0	1.2	0.1
NIH and/or other federal funds	0.8	0.6	0.2
Other (endowments, grants, etc.)	2.9	5.4	1.7

*Data are from the 69 Association for Hospital Medical Education hospitals that responded to the survey reported in this article.

†Data are from the *Council of Teaching Hospitals' Survey of Housestaff Stipend, Benefits, and Funding.* Washington, D.C.: Association of American Medical Colleges, 1989.

The AHME Survey

Concern for the policy implications of such a range led the author to undertake a survey of members of the Association for Hospital Medical Education (AHME), a national organization that includes over 200 teaching hospitals. The survey addressed issues related to graduate medical education activities and expenditures at each institution. This group was chosen because relevant data on the type of hospital that makes up the largest part of its membership — major teaching hospitals not owned or operated by universities — were found not to have been widely collected or analyzed. While the staff of the Council of Teaching Hospitals of the Association of American Medical Colleges (COTH/AAMC) have regularly published excellent data on teaching hospitals, these data usually focus either on the approximately 120 university hospitals on COTH's "Academic Medical Center" list, or on the total COTH membership, of which the academic medical centers constitute a significant percentage.

Hospitals Sampled

Sixty-nine hospitals, or 33% of the organization's membership, returned usable surveys. Such a sample represents — in terms of the available literature on GME costs — a representative and characteristic subject for study. (The representative nature of the responding hospitals is also shown by certain of their characteristics, as is explained below.) The 69 hospitals that responded are located in 19 different states distributed across the country and are representative of the national AHME membership. The data gathered were for the 1989 fiscal year.

Sampled Hospitals' Characteristics

The mean bed size of the responding institutions was 474, with an average enrollment of 91 full-time-equivalent residents. The typical respondent sponsored five residency programs, most frequently in internal medicine, general surgery, family practice, obstetrics-gynecology, and transitional

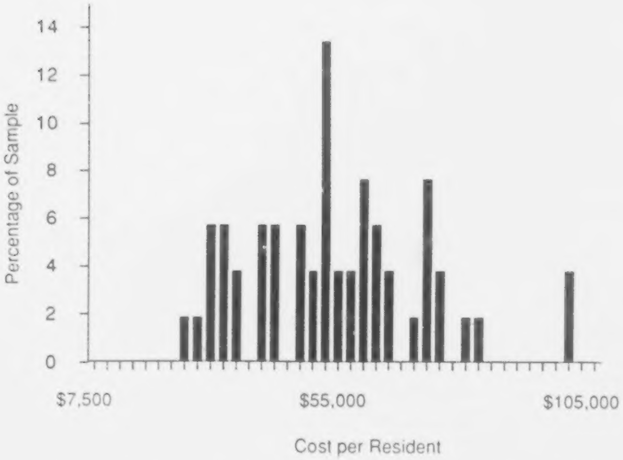

Figure 2. **Direct Graduate Medical Education costs of Association for Hospital Medical Education survey hospitals, fiscal year 1989.**

year (in descending order of frequency), and participated in three more. Eight percent of the respondents were institutions included on COTH's academic medical center list; an additional 66% were listed as major affiliates of at least one medical school. Only 3% reported no medical school affiliation. Fifty-eight percent reported membership in COTH.

Many characteristics of the responding institutions were found to be consistent with the characteristics of teaching hospitals described in reports of previous studies. This is important in considering the applicability of the findings described in this report. Two major areas where the sample data were compatible with earlier findings, for example, were in the areas of sources of funds for, and levels of, housestaff stipends and benefits.

In the area of housestaff stipend and benefit levels, regularly published COTH data provide an excellent source of comparison for data gathered from the sample. As shown in Table 1, the findings from the survey are consistent with COTH data concerning its membership,[3] showing little interinstitutional variability among stipend levels for each postgraduate year.

In the case of funding sources, COTH data are available based on member hospitals' medical school affiliation status, so a more direct comparison is available. As shown in Table 1, comparisons with COTH data[4] once again provide confirmation that findings from the sample can be considered characteristic of the population of community teaching hospitals.

Findings of Interest

The findings of interest are in three general areas: how the DGME per-resident costs in the survey compared with national data, how the components of the DGME costs varied among institutions, and how the size and nature of an institution's educational effort might affect its per-resident DGME costs.

DGME Costs per Resident

Updates of the ProPAC data from the 1984 base year suggest that FY89 direct graduate medical education costs would be in excess of $60,000 per resident. In confirmation of this supposition, the AAMC has calculated an FY89 per-resident mean DGME cost of $63,450 for its approximately 120 academic medical centers.[5] In comparison with this, the mean FY89 per-resident expenditure reported in this survey was lower, at $52,100, and the range was considerably narrower, $20,000 - $100,000. The distribution of these costs is shown in Figure 2. The causes of the apparent lower costs are worthy of investigation, particularly in times of fiscal restraint.

Components of DGME Costs

Analysis of the three major components of the direct costs of graduate medical education at the responding hospitals — housestaff expenses, faculty expenses, and other educational expenses — showed a mean relationship among these variables of 55% housestaff-related, 26% faculty-related, and 19% other-related. However, when the respondents were divided into those with DGME expenses above and below the mean, it was found that faculty-related expenses constituted a higher proportion of total costs at the hospitals with higher DGME costs. Those hospitals that had lower costs reported expending larger percentages of their totals on housestaff stipends and benefits. The sample was then restricted to those 20 respondents that had the ten highest and the ten lowest per-resident DGME costs. As shown in Figure 3, the results of this analysis suggest strongly that further investigation of faculty-related expenses as the component of the DGME costs most responsible for the wide range of per-resident expenses might be fruitful.

Potential for Economies of Scale

Economists employ a concept called "returns to scale" that considers how changes in the levels of inputs in a production process affect the levels of outputs. When costs are also considered, and when through maximizing efficiencies and other steps outputs can be increased without proportional increases in the costs of inputs, then what economists call "economies of scale" are being achieved.[6] Applied to

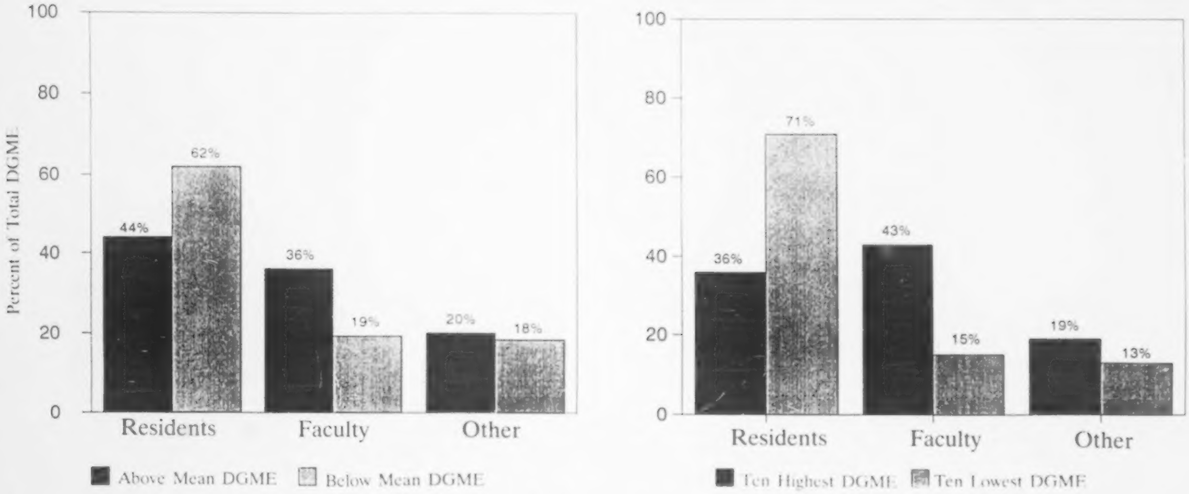

Figure 3. **Variations in the components of Direct Graduate Medical Education (DGME) expenses. The left figure shows variations at 69 Association for Hospital Medical Education (AHME) hospitals with costs above and below the mean on a per-resident basis. The right figure shows variations at 20 AHME hospitals, ten of which had the highest costs per resident, and ten of which had the lowest such costs.**

teaching hospitals, a simplified version of this analysis might suggest that institutions with more and larger training programs would have lower per-resident costs than those with fewer or smaller programs. This is, in fact, what the findings from this study suggest. Those hospitals that had lower DGME per-resident expenses characteristically had more beds, more sponsored programs, and more FTE residents than did institutions that had higher DGME costs. This dynamic was further demonstrated when the 20 institutions with the highest and the lowest DGME costs were examined and compared (Table 2).

These conclusions are borne out by multiple regression analysis, which showed that nearly 35% of the variance in the per-resident DGME costs of the institutions making up the sample could be accounted for by a combination of the faculty-related share of total DGME expenses and the size of the educational endeavor (using number of FTE residents as a proxy for that characteristic).

Conclusions and Recommendations

The wide and unexplained variability in Medicare's per-resident costs for DGME discovered by the staff at ProPAC presents a problem to policymakers and scholars of clinical medical education. While some of the variance is certainly due to institutional differences in accounting assumptions, and some additional variation is due to differing interpretations of Health Care Financing Administration (HCFA) guidelines by the several fiscal intermediaries, a large segment of the total variance remains to be explained.

Table 2

A Comparison of Selected Characteristics between the Ten Most and the Ten Least Costly Hospitals for Per-resident DGME Expenses, 1989–90

Characteristic	Hospitals with Most DGME Expenses	Hospitals with Least DGME Expenses
No. sponsored programs	2.2	5.2
No. FTE residents (DME)	44	112
Resident-to-bed ratio (IME)	.104	.212
No. FTE fellows	7.6	17
Portion of hospital budget spent on housestaff stipends and benefits	1.25%	2.7%
Portion of GME total costs for housestaff expenses	36%	71%
Portion of GME total costs for faculty expenses	43%	15%
Portion of GME total costs for other expenses	19%	13%
Bed size	380	462
PGY-1 stipend	$23,425	$23,820

The data presented in this paper suggest that much of the cost variability may be found in the different ways institutions bill Medicare for the faculty components of their direct costs of GME. This in turn suggests a reason the hospitals in this study reported lower overall per-resident costs than the national data would suggest: lower faculty expenses could reasonably be expected to be found in institutions where the faculty effort is largely volunteer, a feature characteristic of affiliated community teaching hospitals,[7,8] which make up the largest group in this sample.

Further, it appears that economies of scale may also be a factor explaining some of the differences in DGME expenditures among institutions.

These factors suggest two approaches to additional research: first, more detailed investigation of the faculty-related billing practices of institutions that have per-resident costs both above and below the mean—with particular emphasis on the role of volunteer faculty in affiliated hospitals—should be undertaken. Recently published data by Jolly and colleagues[9] on community-based medical schools may be helpful in this analysis. Second, the relationship between fixed and variable costs in GME should be studied, as they may relate to the achievement of economies of scale. Questions to be answered might include what "critical mass" of trainees and/or programs might be necessary to offset fixed costs, once these have been identified. It is suspected that this could most effectively be undertaken on a specialty-specific basis, since the mix of fixed and variable costs of residencies will likely differ from one specialty to another (i.e., internal medical versus surgery).

Such an approach could well yield information important to educators and decision makers at the level of the individual hospital as well as at the state and federal levels as efforts to understand and control the costs of medical education and care continue.

The author is grateful for the assistance and guidance of the Board of Directors of the AHME, the Division of Clinical Services of the AAMC, and Dr. Richard Brown, Mr. Craig Lisk, and Dr. Lauren Sharp.

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ORIGINAL CONTRIBUTIONS

ARTICLES

Medical School Libraries' Handling of Articles That Report Invalid Science

MARK P. PFEIFER, M.D., and GWENDOLYN L. SNODGRASS, M.L.S.

Abstract—In 1989–90 the authors conducted a nationwide study to examine how academic medical libraries handled articles that report invalid science and to determine the effectiveness of any policies implemented to limit the use of such articles. Ninety-five of the 127 medical school libraries the authors surveyed completed questionnaires analyzing policy and attitude issues. Eighty-four of these libraries manually reviewed the available copies they held of ten retracted articles. Of the 811 copies of the retracted, invalid articles reviewed, 742 (91.5%) were not tagged as being invalid. Seventy-nine percent of the libraries had tagged none of the retracted studies and only 16% had policies for managing articles that report invalid science. Academic librarians reflected a common attitude against perceived library censorship and emphasized the user's role in assuring validity. The nation's medical libraries, at least in part by intent, do not commonly identify or have policies to handle the invalid articles they hold. The authors conclude that biomedical researchers, clinicians, and teachers should not assume published studies held in libraries are inherently valid. The lack of stated policy and the disparate assumptions about the role libraries play in this area may perpetuate the use of invalid articles. *Acad. Med.* 67(1992):109–113.

In the last 15 years numerous incidents of both misconduct and honest error have occurred in scientific research. These events have created a significant body of invalid scientific literature, now approximately 100 retracted studies.[1]

While the causes of invalid research, especially of that originating from scientific misconduct, have been widely debated, little is known about how science handles its inaccuracies once published. Considering the thousands of studies published each year, the approximately 100 known retracted works may seem inconsequential. However, through generations of citations in subsequent manuscripts, textbooks, and grant proposals, and through teaching, the spread of invalid information can be greatly magnified. Our prior work[2] revealed that retracted scientific studies continue to be frequently used in ongoing work, with 82 studies being cited 733 times after retraction, a reduction in citation of only about one-third.

Medical school libraries serve as central repositories of scientific literature and are therefore deeply involved in the process of information exchange. Little is known about how academic libraries handle invalid studies, and no national policy for their management exists. Clinicians, researchers, and students may assume published science held in well-managed libraries to be valid unless indicated otherwise. Because libraries have a potentially significant impact on the use of invalid research and thus on future research, teaching, and patient care, we conducted a national study examining the handling of retracted medical literature by academic medical libraries.

Method

The 127 libraries of all the medical schools listed in the *AAMC Directory of American Medical Education*,[3] excluding our own school (the University of Louisville School of Medicine) and those outside the 50 United States, were included in this 1989–90 study.

There were two major components to the study: (1) a direct evaluation of the status of currently held invalid research studies and (2) a survey of medical school libraries' attitudes, knowledge, and policies regarding articles that report invalid science.

For the first component we asked each library to manually examine ten published studies in the condition in which they were held in their libraries, noting whether they were in any way identified as being invalid for the library patron. This identification, also known in library jargon as "tipping in," could be any form of physical notice that tagged the article. The ten articles, published from 1975 to 1986, reported bioscience research results that were later found to be invalid and were followed by published retractions.[4-13] They were selected from a growing pool of 98 retracted studies identified by on-line searches and manual review of editorials and reports on scientific pub-

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lishing. The ten articles used in this study were not randomly chosen but instead were selected for specific attributes that might influence their handling by libraries. Three were from the high-profile general-science journals *Nature*,[11] *Science*,[8] and *The New England Journal of Medicine*,[10] while others were from journals with lower *impact factors* (ratios of citations received and articles published).[14] Five of the works[7-9,12,13] were the only papers retracted by their authors, while the other five were parts of series of retractions. Five[5,6,10-12] were retracted because of apparent scientific misconduct, three[8,9,13] because of apparent pure error, and two[4,7] for reasons that are unclear. Three[5,6,10] were from widely publicized incidents of fraud by well-known scientists, whereas other works were by authors who were less well known. Two[11,13] were from non-U.S. authors. Five[4,6,10,12,13] were retracted in relatively unnoticeable letters to the editor, while the other five had separate retraction notices. One work[10] was noted only as "questionable" in a letter to the original publishing journal[15] but was listed as a retraction in another journal.[16]

The second component of the study was a survey with open-ended and multiple-choice questions evaluating the libraries' current attitudes, policies, and awareness regarding invalid literature. This survey asked medical school library directors to characterize their libraries' formal and informal policies for handling retracted literature. We analyzed academic librarians' levels of awareness of the issues surrounding scientific fraud and asked them to describe how frequently they discussed related issues at staff meetings. We also asked how often library users requested information regarding retractions. Finally, the survey asked librarians to estimate the number of hours they devoted each week to policy or procedure concerning retracted literature, and we asked for their open-ended comments and concerns about this issue.

Results

Ninety-five of the 127 medical school libraries surveyed (75%) participated in the study. Of these, 84 completed the questionnaire and manually reviewed their copies of the ten retracted articles, while 11 completed the questionnaire only. The responding libraries had a wide geographic range, covering 42 of the 44 states with medical school libraries (95%) and the District of Columbia.

Twenty-nine of the 840 copies of the ten retracted articles (3%) were not available at the time of review. Of the remaining 811, only 69 (8.5%) were tagged in any way as being invalid, leaving 742 (91.5%) unmarked. None were reviewed on microfilm.

As shown in Table 1, the percentages of the libraries tagging the ten articles as invalid were consistently low, ranging from 4.8% of the libraries for an article in *The New England Journal of Medicine*[10] to 15.7% for an article published in *Annals of Internal Medicine*.[6]

A total of 66 medical school libraries (79% of those that performed manual reviews) had tagged none of the ten selected articles, while only one library had tagged all ten. Seventy-eight (93%) had tagged five or fewer of the invalid works.

The questionnaire results revealed that only three libraries (3%) had formal policies regarding invalid literature, and another 12 (13%) had infor-

Table 1

Numbers and Percentages of Copies of Ten Invalid Studies Marked as Invalid and Left Unmarked by 84 Medical School Libraries, 1989–90*

	Copies of Articles Marked		Copies of Articles Unmarked	
First Author and Journal	No.	%	No.	%
Milanese,[4] *J. Exp. Med.* (1986)	8	9.8	74	90.2
Slutsky,[5] *J. Am. Coll. Cardiol.* (1984)	8	10.4	69	89.6
Darsee,[6] *Ann. Intern. Med.* (1980)	13	15.7	70	84.3
Kark,[7] *Ann. Neurol.* (1980)	6	7.3	76	92.7
Muschel,[8] *Science* (1983)	6	7.4	75	92.6
Salditt-Georgieff,[9] *Proc. Natl. Acad. Sci.* (1983)	8	10.1	71	89.9
Soman,[10] *N. Engl. J. Med.* (1978)	4	4.8	80	95.2
Gullis,[11] *Nature* (1975)	6	7.5	74	92.5
Glueck,[12] *Pediatrics* (1986)	5	6.0	78	94.0
Danks,[13] *Am. J. Hum. Genet.* (1983)	5	6.3	75	93.7
Total	69	8.5	742	91.5

*As part of a nationwide study examining how medical school libraries handled articles that report invalid science, 127 libraries were asked to review manually the available copies they held of ten retracted, invalid articles in order to determine whether they had marked their copies as invalid. Eighty-four of the libraries performed the manual reviews, covering a total of 811 copies. In the table above, the sum of all copies (marked and unmarked) of a given article may be less than 84 because not all libraries had copies available for manual review. The superscript numbers next to the first authors' names refer to the reference citations listed at the end of this report.

mal policies. Six (6%) maintained lists of retracted works in their reference areas. Forty-six of the responding libraries (51%) had never discussed the handling of retractions of medical literature at staff meetings. (All percentages in this paragraph and the following paragraphs in this section, unless otherwise noted, are based on the numbers of responses to individual questions — (each question received 90 or more responses.)

Thirteen libraries (14%) reported attempting to physically tag all invalid works. Manual review revealed that these libraries had actually tagged 60 of the 125 copies of articles (48%) they evaluated. In addition, nine of the 676 copies (1%) reviewed by libraries that did not attempt to tag retracted works were actually tagged.

Nineteen of the responding libraries (21%) described themselves as "highly aware" of invalid scientific literature and scientific fraud. These libraries had tagged 45 of the 177 articles they reviewed (25%). This tagging rate exceeded by more than six times that of libraries describing themselves to some degree as less aware.

Libraries that had formal or informal policies regarding the handling of invalid scientific literature had tagged 36% and 32% of their reviewed articles, respectively. These schools, making up only 18% of the group completing the manual review, accounted for 70% of the tagged articles in the cohort. The schools without any type of policy had tagged 3% of their reviewed articles.

Sixty-six academic libraries reported their time spent weekly in policy or procedure regarding invalid scientific literature. Of these, 53 (80%) reported no time spent. For all 66 libraries, the amounts of time spent per week averaged 14 minutes, while for the 13 libraries spending some time, the average was 70 minutes per week.

Medical school library patrons rarely requested information about the validity of research publications from libraries, with 69 of the libraries (75%) reporting no such request and another 19 (21%) reporting one or two requests in the preceding six months.

Discussion and Recommendations

An overwhelming majority (91%) of the copies of the invalid scientific articles we studied had not been marked as invalid by our nation's academic medical libraries. Few libraries had tagged significant numbers of retracted articles, with over three-fourths having tagged none of the studies reviewed and only one library having tagged all ten. In addition, few libraries had formal or informal policies regarding invalid literature, and few had attempted to tag or maintain lists of retracted studies. Over 80% of the libraries spent no time each week on policies or procedures related to retracted works.

Clearly, our medical school libraries do not routinely identify retracted, invalid studies and have not developed programs to address this issue. However, assumptions aside, this apparent lack of effort is very likely due not simply to oversight or neglect. Many professionals in library science do not believe libraries can or should judge the integrity or validity of their holdings. The exact roles of "quality filtering" and censorship have been hotly debated at national library and medical publishing meetings. In our study, numerous responding library directors supported a hands-off approach, reflected by the following comment from one director: "The library must not be seen as taking responsibility for the accuracy of the content of library holdings." Another recurring theme in the comments we received was the strong feeling that the users of information have total responsibility for assuring the accuracy of data: "It is the responsibility of the individual using the information to make an informed and intelligent decision. It is not the responsibility of the librarians to predigest data." Even the National Library of Medicine has expressed its concerns that in protecting users from misinformation some possible approaches would place it in "the inappropriate role of censor."[17]

Over the last several years the National Library of Medicine has developed several electronic practices involving MEDLINE to report inaccuracies of previously published works. In 1987, the MEDLINE database[17] began retroactively tagging articles that had been retracted, although some have been omitted from this process of electronic tagging because they have not met specific criteria. A "Comments" tag[18] was added in 1989 to notify MEDLINE users of important follow-up published notices about the original article, including some questioning study accuracy but not qualifying as full retractions. However, no policy on physically identifying the actual articles as invalid has been advanced by either the National Library of Medicine or the Medical Library Association.

Many responding librarians in our study commented that intervention at the local level is unnecessary because all such information is on MEDLINE. However, their position assumes that researchers and clinicians exclusively use MEDLINE to find published studies rather than also using bibliographies, reference lists, textbooks, other indexes, or references from colleagues.

A problem that would remain even if invalid articles were marked systematically at the local level is that users would need to check MEDLINE or their local libraries periodically to determine whether articles they were using had been tagged after their first location of them. Such periodic review by users is unlikely to be a common practice. Thus, interventions at the local library level might be ineffective rather than unnecessary, as some librarians have claimed. A factor further contributing to this possible ineffectiveness is the large number of journals held outside formal libraries in personal, laboratory, and hospital collections.

The results of the present study clearly indicate that the onus for determining the validity of a study currently lies with the user of medical literature. Researchers, clinicians, and teachers are generally familiar with the critical review necessary before accepting any study's conclusions and implications. Students may be less aware. Regardless, even if the evaluation of study design and method is common practice by the readers of scientific research, the determination of the integrity of published results is not. With three-fourths of the libraries reporting no request for information on retractions from users in the preceding six months, users must be determining integrity and validity on their own, or assuming the studies they use report valid results, or globally unaware that published results have even the potential to be inaccurate. Thus, a gap may exist between users approaching libraries as repositories of honest results and libraries considering themselves archivists of both good and bad research.

It is possible the academic community's own attitudes in approaching prior work may play a role in this problem. Concern about the impact of invalid work has been soothed by published commentaries assuring us science cleanses itself of invalid results.[19,20] There is little objective support for such opinions and, in fact, the little work done in the area supports opposite conclusions.[2] In addition, personal attributes of the users may promote this problem. Feinstein[21] has noted the inherent human frailties of scientists that affect their approaches to prior research. Specifically, he identifies "three natural human reactions: the urge to believe what we want to believe; an unwillingness to accept what is contrary to our beliefs; and an abhorrence of anything that suggests we have been wrong or done harm." Thus, it is possible that academicians in general may enter libraries looking more for support than for truth. This mindset could obviously lead to less scrutiny of prior studies.

In the face of these findings what recommendations can be made to limit the continued use of invalid science? We offer the following:

1. Medical school libraries should indicate their policies for handling inaccurate material and, likewise, users should make themselves well aware of these policies. The specific policy adopted may be less important than eliminating the false assumption by some users that libraries uniformly identify invalid work.

2. Currently, users alone are held responsible for determining a study's validity. Because inaccuracy is often not identified until years after publication,[2,22] clinicians, researchers, and educators should periodically review MEDLINE's citations of the studies they use, even those held in personal files for years. While this aspect of re-reviewing work previously accepted as valid may seem impractical, other accurate methods are not available at this time. The increasingly used CD-ROM technologies will also successfully identify retractions, comments, and errata, although there is some delay involved in awaiting the periodic disc updates for previous years.

3. Academic libraries choosing a hands-off policy regarding the integrity of their holdings should continue to work aggressively to educate users that only electronic searches will identify important retractions or corrections.

4. Given the inevitably expanding body of invalid results (caused by fraud or honest error), the broader question of how information should be removed from the scientific community needs to be addressed by organizations of bioscience, library science, and academia. Past emphasis has been placed only on how to get new information into scientists' hands.

Our study was designed to evaluate the effects of the articles' varying attributes on tagging rates. Regardless of retraction format, journal, or author prominence, issues of misconduct versus honest error, or any other attributes, the tagging rate for the articles was low (approximately 5–16%).

The bioscience community should be aware that medical school libraries hold articles that report invalid science. Likewise, libraries should note that many users do not routinely check the status of the studies they use and they may assume libraries integrate new information into their holdings. Because prior research is and will remain critical to new scientific literature, research proposals, and idea development, the handling of invalid research after its publication needs to be addressed. Error will no doubt remain inherent in all human endeavors. The individuals and institutions of science will be well served by efforts to limit readers' use of invalid study results and to promote self-correction of such results by the scientific community.

This work was supported in part by grant 4053-A from the Council on Library Resources, Washington, D.C.

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Faculty Expectations and Primary Care Residents' Perceptions Concerning Residents' Growth in Competence at One Medical School

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Abstract—The authors studied at one school both the developing confidence of primary care residents and the expectations of both internal medicine and specialty faculty members regarding the abilities of the residents. From 1980 to 1988, residents in the study institution's program in internal medicine primary care completed self-assessments concerning their diagnostic and management skills in primary care and several specialties at the start of their training and at the ends of their first, second, and third years. In 1988, the authors elicited the expectations of the primary care and specialty faculties regarding the levels of competence that residents should achieve in the specialties by the end of their third year. When the faculty assessments were compared, the specialists were found to ascribe greater levels of autonomy to residents. The authors conclude that involving residents and faculty members from various disciplines in developing expectations and evaluation criteria can enhance faculty members' perceptions of residents' clinical competence and residents' achievement of it. *Acad. Med.* 67(1992):113–117.

Objectives for primary care training programs emphasize the need for educational environments that provide opportunities to diagnose and treat patients comprehensively.[1–3] But policy analysts[4] caution that primary care medicine should not be construed as equivalent to the medical specialties from which it draws. If faculty members hold discordant expectations for the competence primary care housestaff need, their training and evaluation of the housestaff might be constrained. Diverse studies note raters' implicit assumptions affect their assessments of trainees' competence. One recent study[5] cited the unintentional bias that faculty members invested in their programs' credibility as the factor "most likely" to be responsible for discrepancies between their ratings of trainees and the trainees' scores on the American Board of Internal Medicine certifying examination. In another study,[6] interpretations of surgery housestaff's mistakes—as either expected technical errors or unacceptable failures to discharge obligations conscientiously—depended on how strongly the faculty members believed that the housestaff engaged in critical self-

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SHORT PAPERS

Scholarly Productivity of Geriatrics Senior Faculty Members and Faculty Trainees Compared with That of Other Health Professions Educators

ROBERT E. ROUSH, Ed.D., M.P.H., CARL E. FASSER, P.A.-C., TERESA L. WRIGHT, and NANCY L. WILSON, M.A.

Abstract—To compare the scholarly productivity levels of senior geriatrics educators and faculty trainees, and to compare their productivity with those of other faculty groups, the authors analyzed questionnaires completed in 1988 by 97 senior staff members of geriatrics education centers nationwide and in 1985–1989 by 91 faculty enrollees in the year-long professional development program of the Texas Consortium of Geriatric Education Centers. The chief difference between the two groups was that more senior educators (75%) than enrollees (40%) had published in the three years previous to completing the questionnaire. The authors conclude that the productivity levels of the two groups compare favorably with previously reported productivity levels of health sciences faculties in general. *Acad. Med.* 67(1991):118–120.

With our burgeoning older population growing from the present 12.7% to 20% by the year 2025 (when today's students will still be practicing), the need for more faculty development in geriatrics is self-evident. To address this issue, the Texas Consortium of Geriatric Education Centers (TCGEC) has, since 1985, been involved with the national network of 31 currently funded centers that focus on the continued professional development in gerontology and geriatrics of health professions faculty.[1] Of the 8,456 persons who had attended TCGEC-sponsored programs to date, 251 were "faculty enrollees," representing 15 disciplines. These faculty enrollees participated in a year-long professional development program (PDP) consisting of (1) reading an eight-unit learning module focusing on the effects of normal aging, early and appropriate identification of problems encountered by older persons, improved interdisciplinary interactions among members of the health care team, and instructional strategies and resources for teaching geriatrics; (2) taking a 40-hour, content-intensive institute on the biological, sociologic, and psychological changes associated with age; and (3) completing a capstone experience for the balance of the academic year by developing a personal action plan to incorporate into their respective curricula what they learned in the institute. The TCGEC evaluation plan measured both the immediate impact of the PDP on enrollees and their scholarly productivity.

Based on the premise that only the most qualified, productive scholars in our universities can influence future caregivers to conduct elegant research leading to improved health care and services for all persons, we sought answers to the following questions: Were there significant differences between the scholarly productivity levels of faculty enrollees in a geriatrics PDP sponsored by the TCGEC and a national convenience group of academic gerontologists and geriatricians? How did either group's or both groups' scholarly productivity compare with the publication levels of other faculty groups reported in the literature?

Background

Regarding faculty socialization within academe, research findings have shown that productivity is predicted less by place of preparation, ability, workload, or prior places of work than by one's current environment; thus, those factors that do correlate highly with productivity can be affected by administrators through faculty selection, time allocation, assignments, rewards, and climate.[2] Findings of literature reviews on the scholarly productivity of selected groups of academicians are these: (1) *the professoriate-at-large*—results of two large-scale studies[3] revealed that, irrespective of rank, only 38% of America's college professors had published

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A version of this paper was presented at the annual meeting of the Gerontological Society of America, Minneapolis, Minnesota, November 1989.

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more than five articles; (2) *medicine*—an Institute of Medicine study[4] of former National Institutes of Health fellows revealed median ten-year publication records of 14 for M.D.s and 9 for Ph.D.s, whereas results[5] of a study of 309 graduates of The Robert Wood Johnson Foundation Clinical Scholars Program showed that 76.5% had published an average of 11.93 articles in their five-year posttraining period; (3) *nursing*—a survey[6] of 173 doctoral-level nursing faculty members in research universities showed they had a mean of seven total publications over their 15-year period of experience; (4) *allied health*—for the several professional fields constituting this group, studies[7] showed a .30-to-.70 range of mean annual publications, during ten years of experience; (5) *gerontology/geriatrics*—in the only published study known to us, Peterson and colleagues,[8] on behalf of the Association for Gerontology in Higher Education, found that the 438 educators responding averaged 13 years of experience and that the medical center faculty had published far more (mean = 16) than had their counterparts in universities (mean = 9.6) and colleges (mean = 5.4).

Table 1

Summary Data on Differences between Senior Geriatrics Faculty and Faculty Trainees, 1985–1989*

	Summary Data	
Characteristics	Senior Staff Nationwide ($n = 97$)	Enrollees in Texas Program ($n = 91$)
Age (mean)	44.6 years	43.0 years
Gender		
Male	47.4%	34.1%
Female	52.6%	65.9%
Highest degree		
Doctorate	75.5%	56.0%
Master's	23.2%	26.4%
Baccalaureate	1.1%	17.6%
Tenured	61.1%	31.9%
Experience		
Mean (SD)	15.6 (9.5) years	16.2 (9.4) years
Range	1–42 years	1–48 years
Total publications over three-year period		
Per person† mean (SD)	7.7 (8.6)	4.2 (11.6)
Per published scholar only‡		
Mean (SD)	9.1 (8.6)	13.8 (18.9)
Range	1–37	2–70

*As part of their study comparing the scholarly productivity levels of geriatrics faculty with those of other health sciences educators, the authors compared biographical, experiential, and scholarly data for two groups of geriatrics educators. One group, responding to a questionnaire in 1988, consisted of members of the senior staffs of geriatrics education centers (GECs) nationwide; the other group, responding to a similar questionnaire from 1985 to 1989, consisted of enrollees in the year-long professional development program of the Texas Consortium of Geriatric Education Centers (TCGEC).

†Statistical comparison between the means of the two groups yielded the following result: $t = 2.11, p < .05$.

‡Of the senior educators, 73 (75%) published; of the faculty enrollees, 36 (40%) published; comparison between these percentages yielded a result of $t = 3.50, p < .01$.

Method

A 36-item instrument was mailed to the 107 (faculty) enrollees participating in the TCGEC program from September 1985 to August 1989. Initial responses numbered 77; a follow-up mailing to nonrespondents resulted in 14 additional ones. Given the 85% ($n = 91$) response rate and the absence of differences between early and late responders, it was deemed not necessary to determine whether any response bias existed. (Wave analysis assumes that late respondents are similar to nonrespondents.[9]) The scholarly productivity of the enrollees was compared with that of 97 (88%) of the senior faculty or principal investigators and various members of their project staffs who responded to a similar questionnaire administered during a 1988 meeting held in Houston for key staff of geriatrics education centers (GECs). The data were analyzed using commands for frequencies, descriptives, and crosstabs on a standard computer program for statistical analysis in the social sciences.

Results

The GEC educators, presumably more senior than their somewhat less experienced TCGEC counterparts then being socialized into geriatrics-at-large, consisted of educators from the same eight health fields as the TCGEC enrollees. The proportions of enrollees in these fields were as follows: (1) allied health, 28%; (2) dentistry, 2%; (3) education or other, 23%; (4) medicine, 14%; (5) nursing, 18%; (6) public health, 1%; (7) psychology, 6%; and (8) social work, 7%. The principal differences between the proportions of the enrollees and the senior educators were that, for the senior educators, there were more allied health professionals, at 39%, more physicians, at 19%, fewer nurses, at 8%, and fewer project staff in education or other fields, at 9%. The variations among the proportions in these fields should be taken into account in interpreting the aggregate scholarly productivity data reported.

Summarized in Table 1 are some of

the data on the independent and dependent measures pertaining to the senior educators and enrollees. The senior educators' mean age was 44.6 years; they averaged 15.6 years of experience; 25% had not published a paper in the three years previous to the survey, while those who had published averaged 3.69 papers, 2.33 abstracts, and 1.7 books or chapters, resulting in an annual productivity index of 2.57 for all 97 senior educators. In addition, the senior educators, on the average, had been the coinvestigator or principal investigator of 1.5 funded grants during the previous three years.

The independent and dependent measures of the TCGEC enrollees were as follows: (1) their mean age was 43 years; (2) 66% were women; (3) 87.7% were Caucasian, 3.3%, Black, 6.6%, Hispanic, and 2.2%, Oriental; (4) 56% held doctorates, 26.4%, master's degrees, and 17.6%, baccalaureate degrees; (5) 62.6% had no formal graduate training in gerontology; (6) 83% held faculty appointments, with instructors constituting 16.4%, assistant professors, 41%, associate professors, 24%, and full professors, 15%; and (7) their three-year publication means were 2.65 articles, 1.09 abstracts, and .52 books or chapters in books, totalling 4.26 publications in three years, or 1.42 per year per enrollee. Over the two years following their completion of the TCGEC PDP, the enrollees had produced a posttraining publications mean of 3.77, for an annual productivity rate of 1.89. During the three years previous to their training, 36% of the enrollees had written a total of 98 grant applications, for an annual mean of .99 per grant writer. In the two-year period following their completion of the TCGEC PDP, 42% of the enrollees had written 84 applications for grants, for an annual mean of 1.11 per grant writer.

As regards the dependent measure of scholarly productivity, 75% of the senior educators and 40% of the enrollees had published. On a test of significance between the two percentages, the t of 3.5 produced $p < .01$. The difference between the mean rates of annual total publications of 2.57 for the senior educators and 1.42 for the enrollees was also significant, at $t = 2.11$, $p < .05$.

Discussion

On the primary measure of scholarly productivity, publications, both groups studied were clearly superior to the professiorate-at-large. Also, both groups appeared to be fairly productive compared with other groups dominated by M.D. and/or Ph.D faculty in the health sciences. This comparison is all the more favorable in light of the relatively new position of geriatrics in academic health centers and the highly interdisciplinary nature of the field.

For all geriatrics faculty, but especially for younger ones, it is important for the planners of faculty development programs to systematically foster scholarly productivity. Therefore, they should be aware of the characteristics of productive researchers, as summarized by Bland and Schmitz[10]: productive faculty members have (1) acquired an in-depth knowledge in a research area; (2) mastered methodologic skills; (3) adopted mores and expectations of researchers in their fields, e.g., Ph.D.s are socialized by the writing of their dissertations, whereas M.D.s are socialized to academic medicine during their postresidency fellowships; (4) associated and collaborated early in their careers with distinguished faculty mentors; (5) developed scholarly habits early, since publishing in the first five to ten years is highly predictive of future output; (6) maintained professional contacts and networked with other productive persons; (7) chosen productive departmental peers with whom to share projects and brainstorm ideas; (8) engaged in multiple projects, so if one doesn't work, perhaps another will; (9) scheduled research work for at least 20% of their time; (10) become institutionally oriented by serving on governance and curriculum committees; (11) been motivated by such work factors as creativity, problem solving, and flexibility; and (12) chosen places of work that support the scholarly interest of the faculty, as evidenced by the allocation of sufficient time, provision of assistance, and an atmosphere of academic freedom.

The need to foster faculty productivity in all fields is self-evident; the need to do so in geriatrics is imperative. As he demands for geriatric health care increase, these must be met by a cadre of caregivers educated and guided by appropriately trained faculty who compete academically in the same arenas as well as do other health professions educators.

Funding for the study was provided in part by Grant No. STC-R, 5 D31 AH66005-05, Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health and Human Services.

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A3273-8

MARCH 1992

ACADEMIC MEDICINE

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Health Care Reform: Prospects and Progress
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Comparing Students' Preparation and Performance
Support Services of Residencies in Six Specialties
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Medical Students and Abortion
The Position of Chief Resident: Directors' Views
Book Reviews

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

MARCH 1992
VOLUME 67
NUMBER THREE

ACADEMIC MEDICINE

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; $130/2 years; $185/3 years; and $7.00 per single copy.

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Subscription requests received after June 30th will be honored for the fiscal year (July through June). Subscribers who want back issues for January through June of that calendar year must purchase them as individual back issues at $7.00 each and as available in stock.

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Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
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ORIGINAL CONTRIBUTIONS

ARTICLES

Young Physicians Most and Least Likely to Have Second Thoughts about a Career in Medicine

JACK HADLEY, Ph.D., JOEL C. CANTOR, Sc.D., RICHARD J. WILLKE, Ph.D., JUDITH FEDER, Ph.D., and ALAN B. COHEN, Sc.D.

Abstract—To identify factors associated with apparent disaffection with medicine as a career, the authors analyzed data for 4,931 young physicians surveyed in 1987. Using survey responses, the authors classified 932 of the physicians (18.9%) as most likely to have second thoughts about their career choices and 1,094 (22.2%) as least likely to have second thoughts. The group with the greatest reservations included significantly higher proportions of white women, blacks, and Hispanics. This group reported significantly lower incomes, higher educational debt, and more hours and patients' visits per week. Among employee physicians, those most disaffected were significantly more likely to report inappropriate use of tests and procedures and lack of autonomy in their practices. The authors conclude that it is important to reexamine the heavy reliance on debt financing of medical education, especially for minority students, and to explore the equality of career opportunities for women and minorities in medicine. *Acad. Med.* 67(1992):180–190.

In recent years, newspapers and magazines have published numerous stories highlighting the difficulties and strains of both becoming a doctor and practicing medicine.[1–6] High medical school tuition and large educational debts, long hours, high malpractice premiums and malpractice awards, too many doctors in many areas, and the growing corporate influence in medicine have all been cited as factors making medicine a less attractive career than in the past. A survey conducted in 1989[2] found that 39% of the physicians interviewed would either definitely or probably not go to medical school if they were in college today, knowing what they now know about medicine as a career. Even more recently, a survey[7] of physicians in internal medicine showed that internists' satisfaction with their practices has declined markedly over time.

In trying to assess these reports, we thought it reasonable to ask whether these figures represent anything new about physicians, and whether physicians' career concerns differ from those of other professionals. Although the issues of physicians' and other professionals' career satisfaction have not received extensive analysis, some evidence is available. In a survey[8] of a national random sample of 2,700 physicians conducted in 1973, Colombotos and Kirchner found that only 14.4% had "slight" or "serious" doubts about their decisions to become a physician, while 85.6% had "no doubt at all." Only 3.7% said that they were "not happy" with their careers as physicians. Comparing the 1973 and 1989 surveys clearly suggests that there has been a significant deterioration in physicians' attitudes about their profession.

The American Bar Association conducted two studies[9] of the views of young lawyers, one in 1984 and the other in 1990. In the former, 15% said that they were somewhat (12%) or very (3%) dissatisfied with their current jobs. In 1990, the proportions were 14% somewhat and 5% very dissatisfied. While we realize that a question about current job satisfaction is not equivalent to asking about satisfaction with one's choice of profession, we find it important that another 1990 survey[10] reports that 21% of lawyers were either somewhat (16%) or very (5%) dissatisfied with their current positions, but only 19% said they would choose another career if they had to do it over again.

These reports suggest that physicians' perceptions of a career in medicine may be both more critical than those of other professionals and worsening over time. The goal of our study was to identify factors associated with the apparently high level of second thoughts or regrets that physicians are expressing about their choices of medicine as a career. Are physicians with second thoughts about having become doctors significantly different from other physicians in terms of their backgrounds or current practice situations? If there are significant

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differences, are there any implications for broader social goals, such as improving access to medical care, controlling health care costs, or ensuring the quality of care?

The responses of physicians who are women or racial or ethnic minorities are of particular interest. Increasing the representation of such groups in medicine has been a high priority of medical education and of public policy generally. Once in practice, are minority and women physicians as likely as their white male colleagues to have second thoughts about a career in medicine?

Clearly, an exploratory effort, such as the present study, that identifies and compares the views of physicians at a single point in time cannot provide definitive answers to all of the questions raised. Nor are data available in this analysis to address the psychological, emotional, or other personal factors that could be associated with dissatisfaction. However, by analyzing the practice situations of a large sample of almost five thousand young physicians, our research can contribute to the understanding of both career and current job dissatisfaction, even if it does not identify all of their determinants.

Data and Method

The methodology of this study is reported in three sections. The first describes the data that were analyzed in this study; the second, the construction of the comparison groups of physicians; and the third, the methods used to analyze the data from the comparison groups.

Data

The data analyzed in this report were collected by the American Medical Association's (AMA's) Education and Research Foundation in 1987 as part of a study of the practice patterns of young physicians. (Findings regarding issues other than career satisfaction are reported elsewhere.[11]) The survey was limited to young physicians on the assumption that those just starting out in practice would be influenced more by recent changes in medical education financing and in the health care market than would established physicians. Consequently, young physicians' experiences would be a better barometer of likely future changes than would the experiences of physicians in general.

For the purpose of our study, a young physician was defined to be less than 40 years old and out of graduate training for between two and six years. The first year after completing residency is often highly transitional and may not include a complete year of practice. Other research[12] suggests that physicians' practices undergo the most rapid changes in the first six years after the residency is completed.

The sample population was drawn from the AMA's Physician Masterfile, which contains information about age and training for all allopathic physicians in the United States, regardless of membership in the AMA. The eligible survey sample contained 10,352 physicians, consisting of a simple random sample of 8,651 physicians and an oversample of 1,692 black and Hispanic physicians. Minority physicians were oversampled in order to assure cell sizes large enough to permit reliable comparisons by race and ethnicity. The survey was conducted by telephone between April and November of 1987. Median interview length was 21 minutes.

Just over 10% of the sample (1,089 physicians) either were unavailable during the field period or their telephone numbers could not be obtained. Of the 9,263 physicians contacted, 5,865 (63.3%) completed interviews and 3,398 (36.7%) refused or did not complete the interview. This response rate is comparable to response rates to the AMA's ongoing Socioeconomic Monitoring System survey, which is also conducted by telephone.

The analysis reported in this paper is limited to 4,931 physicians who spent at least 20 hours per week in direct patient care and provided complete information about key variables. (There were 398 physicians not in direct patient care and 536 physicians with incomplete data.) The numbers of responses for specific questions, however, are frequently smaller because of skip patterns in the survey instrument and item-specific nonresponses.

We weighted all data to correct for differential response rates by specialty, AMA membership, country of medical school graduation (U.S. or foreign), and age, and for the initial oversample of minority physicians. A special analysis of nonrespondents to the Socioeconomic Monitoring System survey found that they are similar to respondents, which suggests that the use of these weights corrects for potential nonresponse bias.[13]

Comparison Groups

The physicians were asked early in the interview, "Given what you now know about medicine as a career, if you were in college today would you go to medical school?" Just over one-third (33.6%) of those who answered said "No." One hundred twenty-five physicians (2.5%) either responded that they were not sure or did not answer.

It is possible that some proportion of those who said "No" are not truly dissatisfied with medicine as a career. Some young physicians' responses may have reflected transitory dissatisfaction because the interview caught them on an unusually bad day. For others, an answer of "No" may have reflected their attitudes about the arduous training physicians undertake, rather than their dislike of medicine as a career once they completed training. Another difficulty with interpreting and analyzing the response to the "Would you go to medical school today" question as a measure of career satisfaction is that the answer to the question is unidimensional and dichotomous, while the underlying concepts of career satisfaction and career doubts are clearly multidimensional with many shades of grey. Among those who answered "No," there was likely to be variation in the intensities of and motivations for that response, as was likely among those who answered "Yes."

In order to refine the measurement of career regrets, we used a logistic regression model to relate each response to the "Would you go to medical school today" question to three additional potential indicators of satisfaction with one's current practice: the report of a likelihood of leaving the current practice within two years; whether the physician would have liked to change his or her number of hours worked per week and by how much; and, for each physician who was practicing in more than one specialty or subspecialty, whether the physician would have liked to change the division of his or her time among specialties.

The results of the logistic regression, which are available on request, were then used to calculate a predicted probability of responding "Yes" to the "Would you go to medical school today" question. Not surprisingly, we found that the physicians who expected to leave, wished to decrease the number of hours they worked, or would have liked to alter the division of their time among specialties were significantly less likely to answer that they would go to medical school again.

The physicians were then divided into three groups based on the values of the predicted probabilities and their actual answers to "Would you go to medical school today." Those who answered "Yes" *and* had high predicted probabilities (75th percentile or above) were designated *least likely* to have second thoughts about becoming a physician. Those who answered "No" *and* had low predicted probabilities (less than the median) were designated *most likely* to have second thoughts. All the remaining physicians were assigned to a third, intermediate group, which included physicians whose predicted probabilities of answering "Yes" fell between the 50th and 75th percentiles, as well as physicians whose actual responses apparently contradicted their predicted responses.

The results presented focus on the two extreme groups because the intermediate group was most likely to include physicians whose responses to the questions asked were transitory or otherwise not reflective of their true career and/or job satisfaction. The intermediate group also includes physicians whose answers appeared to be unrelated to specific intentions to change their practice situations. For example, physicians who were in good practice situations, but simply didn't like medicine or, conversely, who were in difficult practices, but had strong commitments to being a doctor may be in this intermediate group. While these physicians' responses may have been perfectly valid measures of the physicians' true satisfaction, they are not necessarily the cases that should invoke a public policy response. Finally, results for the intermediate group, which are available on request, almost always fell between those of the two extreme groups.

There were 932 physicians (18.9%) in the group most likely to have second thoughts and 1,094 physicians (22.2%) in the group least likely to have second thoughts. The former included slightly more than half of the physicians who responded that they would not go to medical school again.

Analysis Methods

We first compared the two groups in terms of their specialty distributions and fixed demographic and background characteristics. We used chi-square and *t*-tests to identify significant differences between the groups most and least likely to have second thoughts. From these results, we constructed descriptive profiles of the physicians in the two groups.

We then estimated a series of multivariate regression models that have as their dependent variables measures of physicians' practice situations. Logistic regression was used for dichotomous dependent variables and ordinary least-squares regression for continuous dependent variables. The latter variables fell into four groups: (1) type of practice and whether the practice was a physician's first choice; (2) measures of income, malpractice experience, and indebtedness; (3) hours, workload, and location; and (4) for employee physicians only, practice style measures.

The key independent variables in the regression models are two dichotomous indicators of whether a physician is in the group predicted to be most or least likely to have second thoughts about having become a physician. The other independent variables are predetermined background characteristics that describe a physician's specialty, race, or ethnic group, sex, age, number of years in practice, type of medical school attended (U.S. public, U.S. private, foreign—physician being a U.S. citizen, foreign—physician being a foreign citizen), whether either parent was a physician, whether the physician's parents were lower or lower-middle income, whether the physician had lived in the current community before beginning practice there, marital status (married, never married, or previously married), and the number of children (including an interaction term between number of children and female sex).

The advantage of this approach is that it permits a rigorous test of the null hypothesis that the values of the dependent variable in the equation are the same in the most likely and least likely groups, controlling for the effects of differences between the groups in specialty mix, demographic characteristics, medical education, and family backgrounds. For example, women physicians have lower incomes and work fewer hours than men physicians.[14-16] In testing the hypotheses that incomes and that hours worked differ in the two groups, therefore, it is essential that the effects of gender be accounted for separately from the effects of career regrets.

The basic form of the regression model is

$$Y_i = A_i + \beta_{1i}ML + \beta_{2i}LL + \Sigma_j \alpha_{ij} X_j,$$

where Y_i = ith dependent variable;
A_i = intercept term, which implicitly includes the intermediate group physicians;
ML = 1 if the physician is in the group most likely to

have second thoughts, 0 otherwise;

LL = 1 if the physician is in the group least likely to have second thoughts, 0 otherwise; and

X_j = control variables (specialty, race, sex, etc.).

The intermediate group of physicians is the omitted reference group, which means that the coefficients β_{1i} and β_{2i} measure the differences between the intermediate group and the most and least likely groups, respectively. (If the equation is a logistic regression, then β_{1i} and β_{2i} are the logarithms of the relative odds for the two groups compared with the omitted reference group.) The null hypothesis of no difference between the most and least likely groups is equivalent to the hypothesis $\beta_{1i} = \beta_{2i}$, which is evaluated with an F-test (or chi-square test for the logistic regressions).

Results

The results are reported in two sections. The first concerns the background characteristics of the physicians in the two groups; the second concerns the characteristics related to the physicians' practice situations, including the physicians' educational indebtedness as of 1987.

Physicians' Background Characteristics

Table 1 shows that there were significant differences in the demographic and background characteristics of the physicians in the two groups. Perhaps most striking is the difference between them in their distributions by race or ethnic group and by sex. Compared with the least likely group, the physicians most likely to express second thoughts had higher proportions of white women, black men, black women, and Hispanics, and a correspondingly lower proportion of white men. Less than 62% of the physicians most likely to have second thoughts about medicine as a career were white men, compared with 70.2% of the physicians least likely to have second thoughts. In contrast, 24.5% of the most likely group were blacks or white women, compared with only 14.8% of the least likely group. Minority physicians other than blacks or Hispanics constituted a somewhat higher proportion of the least likely group.

The results also show that the two groups differed significantly with respect to their specialty distributions. However, these differences were small and occurred in only a few specialties. The most likely group had higher proportions practicing general surgery, obstetrics—gynecology, anesthesiology, and emergency medicine, and lower proportions in pediatrics, psychiatry, and pathology. Physicians practicing other specialties were more equally represented in the two groups.

There was no association between the likelihood of having second thoughts and the type of medical school attended. Nearly equal proportions of graduates from public, private, and foreign medical schools were found in the three groups. Second thoughts about career and job also appear unrelated to age or number of years in practice, although the difference in the latter, while slight, was statistically significant.

There was a significant difference between the groups in family background. Physicians least likely to have second thoughts were less likely to come from lower- or lower-middle-class families and were more likely to have a parent who was a physician. Physicians in that group were also more likely to have resided in their practice areas before beginning their practices than were the physicians classified as being most likely to regret their career choices. In addition, over 21% of the physicians in the most likely group were unmarried, compared with 13% of the least likely group.

Practice Situation Characteristics

This section is divided into three parts, each concerned with a different aspect of the question whether the characteristics of the physicians' practice situations varied with the likelihood of a physician's having second thoughts about his or her career choice.

Type of Practice, Income, Malpractice Experience, and Indebtedness. Table 2 reports whether measures of type of practice, income, malpractice experience, and educational debt varied with the likelihood of having second thoughts about having become a physician. The table shows that the physicians in the most likely group had significantly lower relative odds of being self-employed, compared with the physicians in the least likely group. Further analysis (not reported) of practice type revealed that essentially all of the difference in the relative odds of self-employment is due to those working as partners or owners in group practices. In other words, the relative odds of solo practice did not vary between the two groups ($p = .81$).

The survey also asked the physicians whether their current practices had been their first choice when they were deciding on a practice situation. The overwhelming majority, 93%, were in their first-choice practice. However, the physicians in the most likely group were more than twice as likely as the physicians in the least likely group to say that they had not gotten their first choices.

There were significant differences between the two groups of physicians with respect to income. The physicians most likely to have second thoughts had lower annual incomes by $6,889, and a lower income per hour of work, by $6.57, compared with the other group. The two groups of physicians also differed in their assessments of how their actual incomes compared with what they considered to be adequate compensation for physicians in their respective specialties with comparable experience. The physicians most likely to have second thoughts earned incomes farther below what they considered adequate. They also reported greater reductions in total billings because of providing free or reduce-fee care. We also compared, for physicians who

Table 1

Young Physicians' Background Characteristics by Predicted Likelihoods of Their Having Second Thoughts about Having Become a Physician, 1987*

Characteristic (*p* value in parentheses)†	Percentage Distribution: All Physicians (*n* = 4,931)	Percentage Distribution: Predicted Most Likely to Have Second Thoughts (*n* = 932)	Percentage Distribution: Predicted Least Likely to Have Second Thoughts (*n* = 1,094)
Race/ethnic group and sex (.000)‡			
White male	66.1	61.7	70.2
White female	15.3	19.3	12.5
Black male	2.6	3.7	1.4
Black female	1.2	1.5	.9
Hispanic male	3.6	3.5	3.1
Hispanic female	.8	1.1	.8
Male, other race	7.1	6.6	7.1
Female, other race	3.4	2.8	4.1
Medicine specialty (.038)‡			
General/family practice	16.5	15.9	15.6
General/internal medicine	13.7	14.2	13.4
Internal medicine subspecialty	13.4	12.6	13.4
General surgery	3.5	3.2	2.6
Surgery subspecialty	13.6	13.5	14.5
Pediatrics	8.8	6.9	10.3
Obstetrics/gynecology	6.7	8.6	6.8
Radiology	4.5	4.7	5.2
Psychiatry	4.2	3.5	4.3
Anesthesiology	5.5	6.9	5.0
Pathology	2.0	1.0	2.2
Emergency medicine	2.6	2.5	1.4
Other specialties	5.2	6.3	5.4
Type of medical school (.692)‡			
Private medical school	29.8	28.0	29.4
Public medical school	53.3	57.3	53.2
Foreign medical school, U.S. citizen	3.9	3.3	3.7
Foreign medical school, foreign citizen	13.0	11.4	13.7
Marital status (.000)‡			
Never married	12.1	14.3	9.6
Previously married	4.7	7.3	3.4
Currently married	83.2	78.4	87.0
Parent is a physician (.036)§	15.0	14.2	17.3
Family is of lower or lower-middle economic class (.000)§	19.1	22.0	16.2
Resided in the practice community prior to beginning practice (.000)§	40.8	36.6	43.6

*In 1987, young physicians responded to a survey designed to identify factors associated with physicians' disaffection with medicine as a career. The classifications presented (*most likely* and *least likely*) are based both on the physicians' predicted probabilities of answering "Yes" and on their actual answers to the question "Given what you now know about medicine as a career, if you were in college today would you go to medical school?" See text ("Data and Method" section) for details about how the predicted probabilities were determined.

†For two characteristics, mean values were determined: the average age of all physicians and of those in both groups was 34.7 years (.868); the average years in practice for all physicians and those in the *most likely* group was 3.4 years; that for those in the least likely group was 3.5 years (.005). See footnote § for statistical information.

‡Based on chi-square test of the null hypothesis that distributions within the most likely and least likely groups are identical.

§Based on *t*-test of the null hypothesis that means of variables are equal in the most likely and least likely groups.

practiced in fee-for-service settings, the average fees charged for an intermediate office visit with an established patient. The reported fees, $34.28 and $35.04, were comparable, and not significantly different ($p = 0.31$).

Two other factors often associated with physicians' dissatisfaction are malpractice experience and educational indebtedness. The results in Table 2 show that, on the one hand, there was no significant difference between the two groups with respect to their malpractice expenses or the likelihoods of their having been involved in at least one malpractice claim since starting practice. On the other hand, the physicians in the most likely group carried a significantly larger educational debt ($31,294 versus $23,703) and had an annual repayment on that debt in 1987 that was more than three times as high as that of the physicians least likely to have second thoughts ($5,106 versus $1,667).

Hours, Workload, and Location. As shown in Table 3, the physicians most likely to have second thoughts worked 6.3 hours more per week on average than did those least likely to have second thoughts. On an annual basis, the greater number of total hours per week is equivalent to working five additional 60-hour weeks. (Weeks worked per year did not vary significantly.) The bulk of the difference was due to longer night and weekend hours. The difference in the numbers of administrative hours per week was small, though statistically significant.

Consistent with their longer hours per week, the physicians most likely to have second thoughts also reported more patients' visits per week than did the physicians in the other group. However, we found no significant difference between the two groups in the characteristics of the patients they treated, other than the difference in reduced billings for free or reduced-fee care reported in Table 2. The physicians in the two groups reported treating similar proportions of patients who were poor (20.9%), uninsured (8.9%), had chronic mental illnesses (5.6%), or had disabilities (7.7%). Medicare (24.5%) and Medicaid (10.5%) patients were spread equally across their practices as well. (Results are available on request.)

With respect to location, the results show that the physicians most likely to have second thoughts were significantly more likely to be practicing in nonmetropolitan areas. Not surprisingly, these areas had significantly fewer physicians relative to

Table 2

Young Physicians' Types of Practices, Incomes, Malpractice Experiences, and Educational Debts by Predicted Likelihoods of Their Having Second Thoughts about Having Become a Physician, 1987*

Category	Total No. Responding	Percentage or **Mean Value**			
		All Physicians	Predicted Most Likely to Have Second Thoughts	Predicted Least Likely to Have Second Thoughts	*p* Value for Difference between Most and Least Likely Groups in Relative Odds or Mean Value†
Type of practice					
Percent self-employed	4,927	53.9	49.5	63.4	.000
Percent not in "first-choice" practice	4,931	6.9	9.7	4.8	.000
Income measures					
Net annual income	4,406	$96,044	$94,549	$101,977	.030
Net income per hour	4,396	$36.54	$33.38	$39.93	.000
Percent reduction in billing for free or reduced-fee care‡	2,401	14.3	16.1	13.9	.020
Actual income as percent of self-reported "adequate" income§	4,931	88.2	82.9	93.8	.000
Malpractice					
Malpractice expense, 1986	3,922	$11,211	$11,673	$11,085	.990
Percent who had at least one malpractice claim since beginning practice	4,897	13.4	15.0	12.8	.583
Educational debt					
Education debt at graduation, 1987 dollars	4,845	$24,972	$31,294	$23,703	.050
Annual debt repayment in 1987‖	4,065	$3,295	$5,106	$1,667	.020

*In 1987, young physicians responded to a survey designed to identify factors associated with physicians' disaffection with medicine as a career. The classifications presented (*most likely* and *least likely*) are based both on the physicians' predicted probabilities of answering "Yes" and on their actual answers to the question "Given what you now know about medicine as a career, if you were in college today would you go to medical school?" See text ("Data and Method" section) for details about how the predicted probabilities were determined.

†Derived from a multivariate regression model that controls for the physician's specialty, sex, race or ethnic group, marital status, number of years in practice, type of medical school, physician parents, parental income, and prior residence in the current community.

‡Fee-for-service physicians only.

§Respondents were asked what they considered an adequate annual income for a physician in their specialty and at their career stage.

‖Assumed to be 0 for physicians who reported no debt or debt less than $10,000 at graduation from medical school.

population than did the communities in which physicians least likely to have second thoughts were practicing.

Style of Practice. A final set of questions in the survey of young physicians asked the respondents who were employees to evaluate the "style" of the practices in which they worked. The goal of these questions was to assess employee physicians' autonomy in caring for their patients and the perceived appropriateness of the use of four broad classes of services: consultations and referrals, routine diagnostic tests, expensive tests and procedures, and standardized protocols. These questions were not asked of self-employed physicians because it was felt that responses about their own practices might not be completely candid. Employee physicians, because they practice within frameworks prescribed by their employing organizations, may have less control over patients' treatment than do self-employed physicians. (Of the 4,931 physicians who responded to the survey, 2,298 were employees; of the employees, 471 (20.5%) were in the most likely group, and 400 (17.4%) were in the least likely group).

Table 4 shows that, with the exception of control over one's work schedule, approximately 75% or more of all the employee physicians did not seem to have serious concerns about their autonomy or about the over- or underuse of the services they were asked about. Even with respect to control of their work schedules, more than half (57.4%) felt that they had adequate autonomy.

However, the results reported in Table 4 also clearly show that the physicians most likely to have second thoughts about their career choices were much more likely to respond negatively to the autonomy questions than were the physicians who were least likely to express regrets about their career choices. Except for the question about keeping patients in the hospital, the most likely group's relative odds of responding "No" were two to almost seven times greater. The greatest differences were in the responses to the questions about having the freedom to spend

Table 3

Young Physicians' Hours, Workloads, and Locations by Predicted Likelihoods of Their Having Second Thoughts about Having Become a Physician, 1987*

Category	Total No. Responding	Percentage or Mean Value			p Value for Difference between Most and Least Likely Groups in Relative Odds or Mean Value†
		All Physicians	Predicted Most Likely to Have Second Thoughts	Predicted Least Likely to Have Second Thoughts	
Hours					
Total hours worked last week	4,931	59.1	62.7	56.4	.000
Night and weekend hours worked last week	4,157	11.8	14.6	9.8	.000
Hours spent in administrative activities last week	4,243	5.7	6.2	5.1	.010
Workload					
Total patients' visits last week	4,147	84.1	88.8	82.3	.020
Location					
Percent in a nonmetropolitan area	4,931	18.8	22.0	17.9	.028
Physicians per 100,000 population, 3-digit zip code area	4,021	546.4	449.0	555.3	.010

*In 1987, young physicians responded to a survey designed to identify factors associated with physicians' disaffection with medicine as a career. The classifications presented (*most likely* and *least likely*) are based both on the physicians' predicted probabilities of answering "Yes" and on their actual answers to the question "Given what you now know about medicine as a career, if you were in college today would you go to medical school?" See text ("Data and Method" section) for details about how the predicted probabilities were determined.

†Derived from a multivariate regression model that controls for the physician's specialty, sex, race or ethnic group, marital status, number of years in practice, type of medical school, physician parents, parental income, and prior residence in the current community.

Table 4

Young Employee Physicians' Preceptions about Practice Style and Quality by Predicted Likelihoods of Their Having Second Thoughts about Having Become a Physician, 1987*

Questionnaire Item	Total No. Responding	Percent Answering			*p* Value for Difference between Most and Least Likely Groups in Relative Odds†
		All Employee Physicians	Predicted Most Likely to Have Second Thoughts	Predicted Least Likely to Have Second Thoughts	
Percent answering "no" to **As a general rule, would you say that in this practice you have the freedom to:**					
Spend sufficient time with your patients	2,277	22.7	35.2	11.1	.000
Carefully review patients' medical histories and test results	2,287	15.6	24.7	4.4	.000
Hospitalize patients who, in your opinion, require it	1,979	9.4	12.8	5.9	.003
Keep patients in the hospital for the lengths of time you think are appropriate	1,714	21.4	23.4	21.0	.563
Care for patients even when they are unable to pay the fees and charges	2,187	9.9	15.8	9.1	.002
Order tests and procedures whenever you want to	2,252	13.8	18.7	7.3	.000
Control your own work schedule	2,298	42.6	55.3	27.4	.001
Percent responding to **Thinking about this practice in general, please tell me for each of the following whether you think they are used about the right amount, underused, or overused:**					
Consultations and referrals	2,260				
Overused		12.6	13.6	9.0	.030
Underused		12.6	15.7	7.4	.000
Right amount		74.8	70.7	83.6	—
Routine diagnostic tests	2,288				
Overused		25.4	30.3	21.0	.004
Underused		5.0	7.3	1.9	.001
Right amount		69.6	62.4	77.1	—
Expensive tests and procedures	2,278				
Overused		17.8	23.7	16.1	.007
Underused		12.2	15.8	8.9	.004
Right amount		70.0	60.5	75.0	—
Standardized protocols	2,151				
Overused		8.4	11.0	5.8	.020
Underused		27.4	28.8	25.3	.212
Right amount		64.2	60.2	68.9	—

*In 1987, 4,931 young physicians responded to a survey designed to identify factors associated with physicians' disaffection with medicine as a career. Of these physicians, 2,298 were employees; 471 (20.5%) of the employees belonged to the group classified as *most likely* to have second thoughts about their careers, and 400 (17.4%) belonged to the *least likely* group. The classifications are based both on the physicians' predicted probabilities of answering "Yes" and on their actual answers to the question "Given what you now know about medicine as a career, if you were in college today would you go to medical school?" See text ("Data and Method" section) for details about how the predicted probabilities were determined.

†Derived from a multivariate regression model that controls for the physician's specialty, sex, race or ethnic group, marital status, number of years in practice, type of medical school, physician parents, parental income, and prior residence in the current community.

sufficient time with patients and to carefully review patients' medical histories and test results. The one area in which the groups' responses were similar, the question about having the freedom to keep patients in the hospital for the lengths of time the physician thinks appropriate, may have been affected more than the other areas by factors external to the physicians' practices, such as insurance company utilization review and hospital guidelines for length of stay.

The responses concerning over- or underuse of consultations, tests, and protocols suggest that the physicians in the most likely group had a higher probability of being in practices that deviated on either side of "optimal" use than had the physicians in the least likely group. Although more employee physicians responded that both routine and expensive tests were overused, underuse appears to have occurred as well, and the physicians who were in the underusing practices had a higher probability of being in the most likely group than had other physicians. Conversely, more than three times as many physicians thought that standardized protocols were underused rather than overused, and the relative odds of citing underuse did not vary across the groups being compared.

Discussion

There are many possible reasons that a young physician might have for stating that, in retrospect, he or she would elect not to seek a career in medicine. We did not explore the role of psychological, emotional, or other personal factors that could be important determinants of physicians' dissatisfaction or second thoughts. Rather, our goal was to determine whether other, more objective measures of demographic and practice characteristics at the time of the survey related in a systematic way to physicians' statements about their feelings of satisfaction or dissatisfaction with medicine as a career.

We found that lower incomes, longer hours, more night and weekend hours, a greater likelihood of not being in their "first-choice" positions, greater indebtedness and debt repayment levels, and greater concern (among employee physicians) with professional autonomy and the optimal use of referrals, tests, and protocols all contributed to physicians' having second thoughts about having chosen medicine as a career. (Differences in hours worked should be interpreted with caution, however, because the logistic regression model used to construct the comparison groups was based in part on whether a physician desired to change his or her hours and, if so, by how many hours.) One of the most striking and potentially most troubling findings of the analysis is that blacks, white women, and, to a lesser extent, Hispanics were overrepresented in the group of young physicians most likely to have second thoughts. Consistent with the greater representation of minorities, young physicians in the group most likely to have second thoughts were disproportionately from families of lower or lower-middle economic class and less likely to have a parent who was a physician. They also had greater educational indebtedness at graduation from medical school and had greater repayment obligations as of 1987.

This pattern of disaffection and the nature of some of the factors that contribute to it suggest that policymakers should be concerned. To the extent that young women and minority physicians serve as role models for potential future physicians, then a disproportionately high level of second thoughts among them may "send the wrong message." Aside from hindering attainment of the goal of increasing the presence of women and minorities in medicine, such disaffection among women and minority physicians could have an indirect and adverse impact on access to care. Studies[11,17] have shown that minority physicians are much more likely to treat minority patients, and some observers have argued that broadening the social and demographic mix of physicians is critical to the future of medicine. "A changing, younger profession, more broadly representative of American society, with more moderate economic expectations and a greater commitment to the primary care specialties, will be in a better position to meet the needs for health care in the next century."[18]

Policymakers should also be concerned about the nature of the practices that lead to disaffection. Long hours and lack of professional autonomy may put pressure on the quality of care, while a high rate of turnover among physicians clearly threatens the continuity of care. While disaffected physicians are unlikely to leave the practice of medicine, the practice situations they would like to leave behind may be the result of difficulties imposed by the financing or organization of our health services delivery system.

Our results suggest several possible interpretations, some of which may have implications for medical education. First, there may be a mismatch between expectations upon entering the profession and the realities of practice, particularly among physicians raised in lower-income families. Second, it appears that a poorer economic background, coupled with greater educational indebtedness, makes it difficult for many women and minority physicians to obtain the capital needed to establish a practice in a desirable setting. Third, it is possible that discrimination makes it more difficult for women and racial minorities to practice in the most desirable settings.

Further research is needed to disentangle these and other competing interpretations. If the first is found to be important, then medical schools should reexamine their curricula and their social support systems for students in order to prepare them better for the realities of medical practice. If either of the latter two is found to be important, then serious questions would be raised about impediments to successful medical careers for women and racial or ethnic minorities, and about the role of educational indebtedness in creating the impediments. Specifically with regard to discrimination, medical schools and graduate training programs should reexamine what may be subtle forces that limit the specialty choices and career opportunities of young women and minority physicians.

In the face of major changes in the nature of medical practice, it is also appropriate to examine whether physicians' doubts or dissatisfaction relate to particular developments in the health care field. The results of this analysis allow an examination of some specific factors that may cause (or at least may be associated with) the greater likelihood of second thoughts, i.e., competition in areas with high physician-to-population ratios, malpractice litigation and premiums, and large numbers of uninsured and Medicaid patients. In general, the survey did not find an association between second thoughts and these often-cited changes in the medical practice environment. Perhaps it is because these problems, on a day-to-day basis, are so ubiquitous or, alternatively, because they are insufficiently severe to cause dissatisfaction.

In contrast, our analysis showed a strong relationship between the likelihood of second thoughts and two aspects of young employee physicians' experiences — the lack of autonomy in their practice settings, and their concerns about practice style. Employee physicians most likely to have second thoughts were four times more likely than the other group to say that they did not have sufficient time to spend with patients, and nearly seven times as likely to say that they did not have sufficient time to review patients' medical histories and test results. They were also more likely to report difficulties concerning test-ordering practices, less control over their work schedules, and underuse of consultations and referrals. Only in two areas, keeping patients in the hospital as long as needed and underuse of standardized protocols, was there no difference between the least and most satisfied groups.

Implications for Future Policy

Identifying factors related to physicians' second thoughts about a medical career raises important questions about the future. The finding that medical indebtedness is strongly associated with second thoughts should trigger concern about our society's approach to financing medical education, particularly since high educational debts are far more prevalent among minorities and physicians from low-income families. Equity in career opportunities is a long-standing goal in our society. Disproportionate dissatisfaction and high debts among minority physicians suggest that this goal may be in jeopardy. There may well be a need to restructure current methods of financing medical education.

The effects of possibly subtle discriminatory practices also demand the attention of medical educators. A better understanding is needed of how women and minority physicians in training may be steered toward or away from particular specialty choices, or may be made to feel uncomfortable participating in the full spectrum of medical training opportunities. Eventually, the promotion of qualified women and minority candidates up the academic career ladder will help break down long-institutionalized messages affecting trainees. In the meantime, today's educators must develop greater sensitivity to the needs of these students.

Our finding that the disaffection of employee physicians reflects their concerns about their autonomy to practice quality medicine also calls for further examination. This finding specifically, and the more general finding of physicians' dissatisfaction with practice arrangements, raises questions about young physicians' preparation for the practice of medicine. It is possible that there is a misalignment of expectations upon entering medical school, or even upon completing training, and the realities of practice. The majority (64%) of medical school administrators, department chairs, and faculty reported in a 1989 survey[19] that they were doing only a "fair" or "poor" job of preparing medical students to work in the "changing organizational and financing environment" of medical practice. That survey also revealed that medical educators perceive that specific, ongoing changes in the medical practice environment — rising malpractice premiums, the AIDS epidemic, the problem of the uninsured, and physician payment reform — will have an impact on medical education.[20] Medical educators should take steps to stem future physician disaffection by bringing education more in line with these daily realities of practice. For example, educators should continue to expand the share of medical training taking place in ambulatory and community settings. Greater academic exposure to health care financing and policy issues also appears to be warranted.

In conclusion, the findings from our analysis suggest that policymakers and medical educators ought not to be complacent about the future of medicine. Young physicians' perceptions regarding their career choices appear to be worsening at a time of great change in the nature of practice, and at a rate faster than those of other young professionals. It will, thus, be important in the future to monitor physicians' attitudes toward career choices and to consider appropriate policy and practice changes that address the concerns outlined in this paper. Failure to recognize and heed these concerns may unnecessarily hamper the attainment of avowed societal goals and adversely affect the future of the medical profession.

The research for this paper was supported by grants from The Robert Wood Johnson Foundation to Georgetown University and the American Medical Association. The authors are grateful to William Marder, Ph.D., Robert Hughes, Ph.D., and David Mechanic, Ph.D. for their comments on earlier drafts of this paper. They also thank Susan Kidder, M.A., who was a research associate at the Georgetown University Center for Health Policy Studies, for her contributions to the initial analysis for this report. However, the contents of the paper are fully the responsibility of the authors. No endorsement by the Robert Wood Johnson Foundation, Georgetown University, or the American Medical Association is intended or should be inferred.

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Comparison of Medical School Performances and Career Plans of Students with Broad and with Science-focused Premedical Preparation

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Abstract—This paper reports (1) a method for classifying students according to the breadth of their premedical preparation and (2) a comparison of the medical school performances and career plans of the students thus classified. The method was developed in 1987, in part by using input from a small but representative sample of admission officers. Students were grouped according to undergraduate major, ratio of nonscience-to-science course hours, and extracurricular involvement. After tentatively classifying all individuals who had entered U.S. medical schools in 1981 as having either broad or science-focused preparation, the author compared the two most distinct groups selected from a random sample of the individuals in each classification: 59 individuals constituted the final broadly prepared group, and 73, the science-focused group. The science-focused group attained higher mean scores ($p < .05$) on three science sections of the National Board of Medical Examiners (NBME) Part I examination, and the broadly prepared group scored higher on the Behavioral Sciences section ($p < .05$). No other significant difference was evident between the groups' mean scores on the NBME Parts I, II, or III, or in the groups' rates of experiences of academic difficulty, specialty choice distributions, or percentages of individuals deciding to pursue research careers. The author concludes that this method of classifying students is useful and that the students with less premedical focus in the sciences were able to perform well. *Acad. Med.* 67 (1992):191–196.

The report of the Association of American Medical Colleges' (AAMC's) panel on the general professional education of the physician (GPEP)[1] recommended that the baccalaureate education of physicians include studies in the humanities and social sciences. The panel expressed concern about premedical students who, hoping to gain favor with admission committees, specialize in the sciences during their undergraduate years. Balance among studies in the natural sciences, the social sciences, and the humanities was considered necessary for the development of "values and attitudes that promote caring and concern for the individual and society."[2] Panel members urged medical school admission committees to include appraisals of important values and attitudes in their selection decisions.

Participants in a national seminar on medical education sponsored by the Josiah Macy, Jr. Foundation reaffirmed views presented in the GPEP report. During his seminar presentation, Rogers[3] chided medical schools for failing to try "innovative or risky experiments in admissions and education." Similarly, Neufeld and colleagues[4] encouraged consideration of personal qualities during the selection process and urged medical schools to identify applicants with the potential to become warm, caring physicians.

Medical schools, in accord with the GPEP and other reports, are reevaluating their prerequisite courses and admission criteria and cautioning premedical students against narrow, technical concentration in the sciences.[5] An updated Medical College Admission Test (MCAT)[6] has been designed to encourage students to pursue broad undergraduate study. Empirical studies of the relationship between students' breadth of undergraduate preparation and performances in medical school have not been reported, however. Several studies[7-9] have compared the performances of medical students with different types of baccalaureate degrees and/or different undergraduate majors. The results reveal that science and nonscience majors possess equal undergraduate grade-point averages, achieve equivalent MCAT score levels, and perform similarly in medical school. Performance differences may not be observable when groups are defined solely by type of undergraduate major and/or degree. According to the Creditors,[10] students with nonscience majors report taking as many science and mathematics courses as do science majors.

The current study extends previous research by identifying and quantifying students' characteristics, in addition to undergraduate major and/or degree, that distinguish among types of undergraduate preparation. The medical school performances and career plans of students with different preparations are then compared. Initial effort was directed at developing a system for classifying undergraduate preparation. Both the GPEP report and the Macy report refer to "broad," "balanced," and "well-rounded" preparation, but neither provides an operational definition of such terms. To develop such a definition, input from a representative sample of admission officers was solicited to determine criteria typically used to identify individuals with broad undergraduate preparation and those with science-focused undergraduate preparation. It was hoped that this approach would result in a classification system generalizable to a variety of institutions.

The classification system was tested during the second part of the study. Two groups of students with different undergraduate experiences were identified and their medical school performances and career plans compared. Medical school perform-

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ance comparisons were based on the students' scores on Parts I, II, and III of the examinations sponsored by the National Board of Medical Examiners (NBME) and on the incidences of academic difficulty. Comparisons of the students' career plans were based on responses to the AAMC Graduation Questionnaire (GQ) administered to medical students just prior to graduation. Responses to the following two GQ questions were compared: (1) the type of specialty in which the students planned to seek certification and (2) the extent to which the students intended to focus their careers on research.

Classification Method

In October 1987, admission officers at seven U.S. institutions were requested to review all available application materials for their 1987 entrants and to identify ten individuals with broad undergraduate preparation and ten students who had focused heavily on the sciences during their premedical years. The schools were geographically representative and included both public and private institutions of various sizes. The participants each submitted two lists of entrants and provided a summary of criteria used in identifying the students. Applications for these students were obtained from the American Medical College Application Service (AMCAS) files, and identifying information was obscured. Using the selection criteria noted by the admission officers, the applications were examined to identify the characteristics common to entrants in each group across the various institutions. Methods demonstrated by Willingham and Breland[11] were used to glean information about the students' personal characteristics from the medical school applications.

Classification Results

Examination of the applications revealed that the entrants considered to be broadly prepared had majored in a nonscience area or enrolled in a variety of nonscience coursework and had participated in a wide variety of extracurricular activities. The science-focused entrants tended to have been physical or biological science majors with few nonscience course hours. Although extracurricular involvement was frequent among this latter group, their areas of activity were largely restricted to medical or scientific fields.

A ratio of nonscience to science course hours was computed. Courses in biology, chemistry, physics, and mathematics were considered science; all others were considered to be nonscience. Broadly prepared students tended to have a ratio of nonscience to science course hours of .60 or higher, while the value for science-focused students was typically .40 or lower.

Nonscience-related activities were classified into 13 types; the types of participation were counted for each entrant. A description of the classifications and examples of the activities included within them are the boxed list, "Types of Extracurricular Involvement Indicated by Medical School Entrants, 1987." Broadly prepared students tended to participate in at least four types of nonscience activities, while those classified as science-focused were typically active in three or fewer types.

Occasionally, students had participated in four or more activities that all fell into one category. If the activities were unrelated to the sciences and to the student's coursework, they were considered in the same manner as four types. For example, a student majoring in biology and participating in dance, drama, chorus, and art (all fine arts activities) would be credited with four types of activities. The same fine arts activities would not be counted as four types for a student majoring in a fine arts area. This reflects a decision that a broad education should encompass exposure to a variety of experiences.

Based on this examination of applications, the following operational definitions were developed. Broad preparation was defined by (1) participation in four or more types of nonscience-related extracurricular activities or participation in one type of nonscience activity extensively and separate from coursework and (2) pursuit of an undergraduate major in a nonscience area or achievement of a ratio of nonscience hours to science hours of at least .60. Science-focused preparation was characterized by (1) participation in three or fewer types of nonscience-related extracurricular activities, (2) pursuit of a biological or physical science undergraduate major, and (3) a ratio of nonscience to science semester hours of .40 or less.

Comparison Method

In 1987 a data set was retrieved from the AAMC's Student and Applicant Information Management System (SAIMS) of all 1981 entrants to U.S. medical schools ($n = 15{,}914$). The 1981 cohort was selected for study because sufficient time had passed for most to complete medical school and to take all three parts of the NBME.

The research was completed in several steps. Preliminary groups of broadly prepared and science-focused students were formed from the SAIMS data file using automated data elements (undergraduate major and number of nonscience and science course hours). A random sample of 125 students from each group was then selected, and their AMCAS applications were examined to further refine groupings. In order to maximize the probability of detecting group differences, only students who clearly fit into one of the defined groups were included in the study. A total of 59 broadly prepared and 73 science-focused students were retained for further study. The majority of those excluded either had high ratios of nonscience to science semester hours but had restricted their extracurricular participation to science-oriented activities, or they had low nonscience-to-science ratios but had participated in more than three nonscience activities.

In 1988, NBME, academic difficulty, and GQ data were added to the automated file after the student groupings were refined, and all identifying information was removed. Means were calculated for each group on the total and subscores of the NBME, and analyses of variance were conducted. To discover whether

Types of Extracurricular Involvement Indicated by Medical School Entrants, 1987

Activity	Description	Examples
Advisory work	Activity requiring counseling or advising	Residence hall advisor; hotline counselor
Journalism	Writing for campus newspaper or yearbook	Editor of campus newspaper; yearbook editorial staff
Community work	Organized activity performed for the benefit of the community	Lions Club; Jaycees; Big Brother/Big Sister program
Fine arts	Organized activity involving dance, drama, music, art, photography	School play; school band; yearbook photographer
Political action groups	Groups organized for particular social/political causes	Students Against Drunk Driving; No Nukes
Fraternal organizations	Groups organized primarily for social activities	Fraternity/sorority; residence hall social committee
Athletics	Organized team sport or recreational activity	Intramural hockey; horseback riding; cheerleading
Student government	Student organizations whose purpose is to deal with campus policies/rules or student life	Student council; residence hall discipline committee
Teaching	Activity in which student actively participates as an instructor	Teaching assistant; classroom aide; private tutor
Travel	Travel outside continental U.S.	Foreign exchange student; family trip to Europe
Clubs (other than above)	Clubs unrelated to the sciences, undergraduate major, or honors societies	Culture/film societies; foreign language clubs; hiking/camping groups
Nonprofessional employment	Work not requiring bachelor's degree and unrelated to science labs, hospitals, or medicine	Waiting on tables; office assistant; factory worker
Professional employment	Work requiring bachelor's degree and unrelated to science labs, hospitals, or medicine	Teacher; social worker; accountant

any observed differences on the NBME tests were attributable to premedical academic characteristics, an analysis of covariance was performed using as the covariate each student's average MCAT score (i.e., the average of the six section scores). The incidence of academic difficulty for each student was determined by the examination of data on the student's academic status. Changes in academic status, such as transfers or dismissals, are submitted periodically to SAIMS by institutions to reflect students' progress through medical school. When a student graduates, the date of graduation is noted. The presence of a code indicating that a student took a leave of absence or was required to withdraw as a result of academic problems was regarded as an indication that the student had experienced academic difficulty. In some cases, graduation had been delayed but no explicit reason for the delay, such as leave of absence for health reasons, was available. Since status code changes are not submitted for students repeating an academic semester or year, an unexplained delay in graduation was also regarded as evidence of academic difficulty. Earlier research[12,13] documents the validity of these classifications of academic difficulty. The rates of the incidences of academic difficulty in the two groups were compared using chi-square analysis.

The specialties in which graduates planned to seek certification were grouped into three categories: (1) specialties with a high degree of doctor–patient interaction (family practice, internal medicine, obstetrics and gynecology, pediatrics, and psychiatry); (2) surgery and surgery subspecialties (surgery, orthopedic surgery, neurological surgery, thoracic surgery, plastic surgery, and colon/rectal surgery); and (3) all other specialties. Chi-square analysis was used to compare the frequencies with which individuals in the two groups selected specialties in these categories. The degrees to which graduates in the groups expected to be involved in research during their careers were also compared.

Comparison Results

The results of the comparisons of the data pertaining to the broadly prepared and science-focused groups are reported in three sections. The first reports comparison of NBME performances; the second, rates of incidence of academic difficulty; and the third, career plans.

NBME Performances

Statistically significant differences ($p < .05$) were evident on several of the NBME Part I tests. The broadly prepared group performed significantly better on the Behavioral Sciences section, while the science-focused group scored significantly higher on the Physiology, Biochemistry, and Pharmacology sections. No significant differences between the groups' scores were found when comparing performances on Parts II and III. The columns labeled "Unadjusted Mean" in Table 1 display data on the groups' mean performances on the NBME.

In preparation for analysis of covariance, group means on the MCAT were compared, revealing statistically significant differences ($p < .05$) on the four science sections. The group means for the sections of the MCAT were: *Biology*, broadly prepared group, 9.3, science-focused group, 10.1; *Chemistry*, broadly prepared group, 9.6, science-focused group, 10.4; *Physics* broadly prepared group, 9.5, science-focused group, 10.6; *Science Problems*, broadly prepared group, 9.5, science-focused group, 10.3; *Skills Analysis: Reading*, broadly prepared group, 9.0, science-focused group, 8.9; and *Skills Analysis: Quantitative*, broadly prepared group, 9.4, science-focused group, 9.5.

In Table 1, the columns labeled "Adjusted Mean" display group means on the NBME that were adjusted for MCAT score levels. Group differences between means lessened when adjusted for MCAT score levels, but statistically significant differences remained between the means of scores on Part I Physiology, Biochemistry, Pharmacology, and Behavioral Sciences.

Incidences of Academic Difficulty

Examination of academic status data revealed that 87% ($n = 51$) of the

Table 1

Comparison of Mean Performances on the NBME by Broadly Prepared and Science-focused Groups of 1981 Medical School Entrants*

	Broadly Prepared Group		Science-focused Group		
NBME	Unadjusted Mean	Mean Adjusted for Each Individual's Average MCAT Score	Unadjusted Mean	Mean Adjusted for Each Individual's Average MCAT Score	*F*-Ratio of Adjusted Means
Part I	($n = 48$)		($n = 64$)		
Anatomy	506.5	512.7	542.2	537.6	1.5
Physiology	483.8	490.3	533.8	529.0	5.3†
Biochemistry	508.3	513.1	553.1	549.6	4.1†
Pathology	485.7	490.6	524.5	520.9	2.3
Microbiology	512.4	526.3	545.3	541.6	.7
Pharmacology	500.5	506.0	563.4	559.3	6.7†
Behavioral Sci.	567.0	573.6	523.1	518.0	11.0†
Total score	510.8	517.7	551.5	546.4	2.5
Part II	($n = 43$)		($n = 61$)		
Internal Med.	490.5	499.5	509.6	503.3	.0
Surgery	474.5	482.3	500.8	495.4	.4
Ob.-gyn.	507.0	511.2	488.9	485.9	1.7
Prev. Med.-Public Health	513.5	525.2	512.5	504.3	2.0
Pediatrics	502.9	508.6	521.6	517.7	.2
Psychiatry	543.7	549.7	541.4	537.2	.4
Total score	505.7	515.1	514.9	508.3	.1
Part III	($n = 42$)		($n = 54$)		
Total score	516.8	520.9	521.9	518.7	.01

*In 1988, as part of a study on classifying students by the breadth of their premedical preparation, the author compared various performances of the two most distinct groups that were selected from small random samples of all the individuals who had entered U.S. medical schools in 1981: 59 individuals constituted the broadly prepared group, and 73, the science-focused group. By the end of 1987, most individuals in both groups had taken all three parts of the National Board of Medical Examiners (NBME) comprehensive examinations. The author obtained adjusted mean scores in order to discover whether observed differences on the NBME were attributable to group differences on the MCAT, by performing an analysis of covariance using as the covariate each individual's average MCAT score (i.e., the average of the six section scores).

†$p < .05$.

broadly prepared students and 92% ($n = 67$) of the science-focused students did not encounter academic difficulty. Thirteen percent ($n = 8$) of the broadly prepared group and 8% ($n = 6$) of the science-focused group experienced academic problems. A chi-square estimate revealed that group differences in academic difficulty rates were not statistically significant ($X^2 = .98$, df = 1, $p > .05$).

Career Plans

Because medical school graduates are not required to complete the GQ, responses were available for a limited number of students in the sample. Of the broadly prepared students, 63% ($n = 37$) responded to the questionnaire; 59% ($n = 43$) of the science-focused students responded. The percentages presented in the following paragraphs are based on the numbers of students for whom GQ data were available.

Comparison of GQ responses revealed that the broadly prepared students were slightly more likely to seek certification in specialty areas with high doctor–patient interaction (49%; $n = 18$) than were the science-focused students (33%; $n = 14$). The science-focused students were more likely to select the surgery specialties (16%; $n = 7$) than were the broadly prepared students (8%; $n = 3$). The science-focused group more frequently reported plans to obtain certification in other specialty areas (47%; $n = 20$) than did those with broad preparation (32%; $n = 12$). The remaining students in each group were undecided with respect to specializing. Chi-square analysis revealed that these group differences were not statistically significant ($X^2 = 2.008$, df = 2, $p > .05$).

When the students' plans for research involvement were compared, group responses were similar. Over half of each group indicated they intended to be significantly or somewhat involved in research (57% of the broadly prepared and 56% of the science-focused students). The remainder planned to have limited or no involvement in research.

Discussion

The classification system developed for this study demonstrates one method for assessing breadth of undergraduate preparation. It is hoped that the operational definitions developed in the study represent the current thinking by admission officers and provide a framework adaptable to individual institutions' needs.

Science-focused preparation as defined in this study represents traditional premedical training, the type of background often perceived by students as increasing their chances of acceptance into medical school. Broad preparation typifies the more contemporary view of premedical training advanced by the GPEP panel and others. Students who follow recent advice and pursue the latter type of training deserve reassurance that they will not be disadvantaged when faced with the medical school curriculum. The classification system was intentionally designed to maximize the likelihood of uncovering differences. The science-focused group identified by this study clearly restricted their undergraduate activities to science-related areas, whereas the broadly-prepared group had minimum exposure to the science areas.

In spite of these background differences, the groups performed similarly on all criterion measures except four sections of the NBME Part I. Statistically significant differences were found for these sections, with the broadly prepared group scoring higher on a clinically oriented section (Behavioral Sciences) and the science-focused group scoring higher on several basic-science-oriented tests (Pharmacology, Biochemistry, and Physiology). It may be that differences in preparation result in performance differences in the early years of medical school. Perhaps some basic science material is familiar to science-focused students but relatively new to more broadly prepared students. If this study had included comparisons of first- and second-year grades, additional performance differences might have been apparent.

After a period of time in medical school, the groups appeared to become more homogeneous. Mean performances on the NBME Parts II and III were equivalent. Significant differences were not evident when rates of academic difficulty were compared. The groups were equally likely to become involved in research. Although the relative proportions varied, individuals from both types of backgrounds planned to specialize in each of the three specialty areas. Because comparisons of career plans were based on very small sample sizes, observed differences should be interpreted cautiously. Statistically significant differences might have been found had sample sizes been larger.

Medical schools planning to include consideration of undergraduate preparation in their admission processes should keep in mind that operational definitions must be adapted to the unique characteristics of a particular school's applicants and tailored to meet specific institutional missions and goals. The accessibility of extracurricular activities in the undergraduate environment should be considered. A student's opportunities to participate extracurricularly may be restricted by the availability of activities, personal commitments, family responsibilities, or financial obligations. For example, a biology major who must contribute to his or her own financial support may find employment in science laboratories most easily accessible. Students attending larger institutions may have more opportunity to participate extracurricularly and may encounter a wider variety of activities. These factors must be considered to ensure that applicants are not penalized for circumstances beyond their control.

Further refinement of classification procedures might include attempts to attach personal qualities to types of undergraduate experiences. Responsibility, maturity, integrity, resourcefulness, and perseverance are attributes judged to be important personal qualities for prospective medical students.[6,14] It may be possible to identify specific experiences that enhance the development of these attributes.

Future research examining the relationships between types of extracurricular involvement and the development of certain personal qualities would be valuable. Consideration of extracurricular involvement may be particularly useful for special groups of applicants. For example, previous research has shown community involvement to be an important predictor of minority students' success in medical school.[15]

This study does not propose to establish a link between type of premedical preparation and the affective physician characteristics lauded by the GPEP panel and others. Such a conclusion could be drawn only after studying ratings of clinical performances. The results do provide assurance that students with science-focused premedical preparation and those with broad baccalaureate preparation perform similarly on the NBME examinations and progress in an equivalent fashion through medical school. For institutions that wish to emphasize the importance of broad, well-rounded undergraduate preparation, these results suggest that such preparation will not negatively affect a student's performance in medical school.

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Comparison of Support Services Offered by Residencies in Six Specialties, 1979–80 and 1988–89

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Abstract—The purpose of this study was to determine the availability of each of 19 support services offered by residencies in six specialties in 1988–89 and to compare the results with those of a similar survey performed a decade earlier. A questionnaire was sent to a random sample (576 residencies) of the nation's programs in family practice, internal medicine, obstetrics–gynecology, pediatrics, psychiatry, and surgery. Nearly all responding programs (493) scheduled residents on-call every third night or less frequently. Training programs in all the specialties studied, except pediatrics, offered fewer part-time residencies and, except psychiatry, offered more child care services. Night-shift rotations were used more often in internal medicine, obstetrics–gynecology, and pediatrics programs than in the other specialties. Family practice programs were more likely to offer support groups and various seminar-type experiences. Despite the recent attention to residents' working hours and conditions, many programs in many specialties do not yet offer a variety of commonly utilized, effective support services for residents during training. The authors conclude that with mounting pressure from legislative and regulating bodies, now is the time for the profession to voluntarily incorporate support services for residents into training programs. *Acad. Med.* 67(1992):197–202.

In the aftermath of the nationwide publicity surrounding the death of Libby Zion under the care of house-staff in a New York hospital, increased emphasis has been focused on stress, coping, and environmental support in graduate medical education. Individual residents vary in their abilities to cope, with some thriving and some becoming impaired. Impairment can be defined as a state wherein the resident's ability to care for self or others, particularly patients, is hampered because of emotional illness or substance abuse. Studies[1,2] have found that 7–12% of residents may use drugs and that as many as 10–40% of first-year residents experience depression each year.

Stress is an inevitable component of residency training. Residents are expected to be responsible for the lives of others, yet they perform often without confidence in their abilities or experience and without supervisory personnel immediately available. Pervasive throughout training, especially during the early years, is a fear of making mistakes and a dread of the effect of these mistakes on others (death or disability) and self (loss of self-esteem or reputation, or termination from the profession). Responsibilities are met in an environment where time is a precious but scarce resource: trainees experience a sense of never having enough time to provide optimum patient care, learn all that is necessary, and "get the work done." Acute and chronic sleep deprivation from extended duty hours is a regular attribute of resident life. Residents perceive a sense of isolation from family, friends, and nonmedical life because they are on call frequently, work late, and often work a portion of each weekend day even when not on call in order to provide continuity of care. Furthermore, residents are often isolated from their familiar support systems when they enter training programs in new communities, without friends or family nearby.[3]

Coping with the stress of residency can be viewed as a joint responsibility of the individual resident and the training program whose curriculum is designed to teach trainees the skills they will need to provide patient care and to enable them to serve long and productive medical careers.[4–7] The publicity surrounding the Libby Zion case catalyzed changes in state laws governing residents' working hours and supervision,[8–12] and influenced the regulation of graduate medical education through the Accreditation Council on Graduate Medical Education (ACGME). Twenty-three of the 24 residency review committees have recently included training standards focusing on residents' working hours and supervision, while recommended overall standards are currently being considered by the ACGME for all teaching hospitals.[13] For this study, the authors chose to measure what support services are currently offered by programs and how such services compare with the results of a similar survey reported by Berg and Garrard a decade previously.[14]

Method

In 1988 the authors surveyed residencies in family practice, internal medicine, obstetrics–gynecology, pediatrics, psychiatry, and general surgery to assess the availability of support services for residents. After carrying out a pilot survey at local residencies, the authors sent questionnaires to 576 randomly selected residencies. Fifty percent of the family practice residencies in the United States (197

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programs) and 25% of the programs in each of the other five specialties were surveyed (116 programs in internal medicine, 72 in obstetrics–gynecology, 60 in pediatrics, 55 in psychiatry, and 76 in general surgery).

In addition to assessing the number of first-year residents in the program, length of paid vacation, and frequency of night call, the survey assessed the availability of 19 specific support services. These services are shown in the following list, which, with minor editorial changes, reflects the wording of the questionnaire. Asterisked(*) items were also assessed in the previous survey by Berg and Garrard.

1–2. Confidential professional counseling (i.e., (1) *counselors available within the residency at reduced or no fee, or (2) benefits supplied by the residency or hospital for counseling)

3–5. Ongoing support groups for (3) *residents, (4) significant others or spouses, or (5) *residents and significant others or spouses

6. Balint-type seminars—ongoing "problem patient" seminars focused on the doctor–patient relationship

*7. Seminars or speakers dealing with emotionally charged medical issues (for example, the dying patient)

*8. Seminars or speakers dealing with the stresses and conflicts of being a physician (for example, physician drug abuse)

*9. Financial advisors to help residents deal with financial concerns

*10. Formal "gripe sessions"—an avenue for voicing complaints and requests for program change

11. Resident participation in decision making—participating on hospital committees, with residency curriculum, etc.

*12. Part-time residency—decreasing the ongoing time commitment while lengthening the duration of residency (for example, shared residency positions)

13–15. Alternative residency scheduling involving time off without lengthening the duration of residency (i.e., (13) night float system, (14) postcall time off, and (15) residency-sponsored "mental health" days that allow residents half or whole days away from work)

*16. Social activities planned and sponsored by the residency (for example, parties, sports events)

17. Residency retreat—opportunities for all residents to get away from the program together, with coverage provided by the program

18. Orientation—a week- or month-long program for the new residents with limited patient care responsibilities

*19. Child care services—day care or babysitting services sponsored by the residency program or hospital and available on an ongoing basis to residents who are parents

Programs that did not respond to the first mailing were sent a second and, if needed, a third questionnaire during the first half of academic year 1988–89. Response rates were 74% in obstetrics–gynecology ($n = 53$), 79% in internal medicine ($n = 92$), 87% in pediatrics ($n = 52$), 87% in psychiatry ($n = 48$), 89% in surgery ($n = 68$), and 91% in family practice ($n = 180$); a total of 493 programs responded (86%). Examining the nonresponding programs revealed no difference in size or geographic region compared with the responding programs. The responses were analyzed to compare between specialties with respect to the availability of services in 1988–89 and, where applicable, between the present survey conducted in 1988 and Berg and Garrard's survey[14] of 481 residencies conducted in 1979. It was impossible to compare data concerning the availability of one service—support groups for residents and spouses—collected in both 1979 and 1988, because of incomplete reporting of the 1979 results. The comparisons between specialties were carried out using Kruskal–Wallis and Mann–Whitney paired-group tests, depending on whether responses were ordinal or interval-scaled. Comparisons between the two surveys were made difficult by the fact that while it is likely that some overlap existed between the programs surveyed in 1979 and in 1988, only summary information was available for the earlier years, so it is not known which programs were part of both samples. For purposes of analysis, these samples were assumed to be independent and comparisons were made based on X^2 tests. If the results of the two questionnaires were positively correlated, then these inferences should be more conservative than their nominal significance levels would indicate.

Results

The average numbers of first-year residents per program were 6.5 in family practice, 18 in internal medicine, 5 in obstetrics–gynecology, 11 in pediatrics, 7 in psychiatry, and 11 in surgery.

The mean frequencies of night call for first-year residents in the six specialties ranged from every 3.3 nights in surgery to every 5.8 nights in psychiatry. For the individual specialties, the data on the frequencies of night call were as follows: psychiatry (48 programs), mean, 5.8, range 3–14; internal medicine (92 programs), mean, 4.3, range, 3–10; family practice (180 programs), mean, 4, range 3–12; pediatrics (52 programs), mean, 3.7, range, 3–5; obstetrics–gynecology (53 programs), mean 3.6, range, 2–6; and surgery (68 programs), mean 3.3, range, 2–5. Most programs assigned first-year residents on-call duties every third night or less frequently. Only one of 53 obstetrics–gynecology programs responding (1.89%) and five of 68 surgery programs responding (7.35%) reported night call more often than every third night for first-year residents.

The average lengths of paid vacation for first-year residents in the six specialties were 2.6 weeks for family practice, 3 weeks for surgery, and 2.9 weeks for internal medicine, pediatrics, psychiatry, and obstetrics–gynecology. Most programs offered first-year residents two weeks or more of paid vacation. Five of 180 family practice programs responding (2.78%) offered less than two weeks per year (two offered 1 week, three offered 1.5 weeks). One of 48 psychiatry programs responding (2.08%) offered no vacation for first-year residents.

The most prevalent support services identified were residency-sponsored social activities, available in more than 90% of programs in all spe-

Table 1

Percentages of Residencies in Six Specialties that Offered Specific Support Services, 1988–89[*]

Service	Family Practice ($n = 180$)	Internal Medicine ($n = 92$)	Obstetrics–Gynecology ($n = 53$)	Pediatrics ($n = 52$)	Psychiatry ($n = 48$)	Surgery ($n = 68$)
Residency-sponsored social activities	94	93	90	93	90	95
Resident retreats	51	27	25	61	90[†]	15
Formal gripe sessions	94	89	77	91	83	78
Resident participation in program and institutional decision making	95	90	88	87	95	86
Professional counselors in the program	86	71	44	65	53	58
Financial benefits for professional counseling	60	54	56	47	70	58
Financial advisors on staff	43	17	27	30	8	28
Residency orientation week or month	86	60	58	67	73	68
Support groups for residents	72[†]	30	21	48	58	32
Support groups for residents and spouses	28[‡]	7	8	9	5	20
Support groups for spouses	27[†]	10	18	12	5	15
Seminars and/or speakers on emotionally charged medical issues	93[†]	71	58	83	80	66
Seminars and/or speakers on stresses and conflicts of being a physician	85[†]	34	31	50	48	43
Seminars on doctor–patient relationships (Balint-type)	44[†]	11	8	22	28	8
Night float rotations	5	27[¶]	21	24	3	3
Mental health days off duty	26	32	19	35[‖]	18	14
Postcall time off duty	15	28	19	37[§]	15	8
Part-time residency	11	15	2	24	40	0
Child care services	21	20	13	22	8	24

[*] To determine the percentages of training programs that offered each of 19 support services to residents in 1988–89, the authors surveyed a random sample of 576 residencies; a total of 493 (86%) responded. The response rates by specialty were as follows: obstetrics–gynecology, 74%; internal medicine, 79%; pediatrics, 87%; psychiatry, 87%, surgery, 89%; and family practice, 91%. For a comparison of the results of this survey with those of a similar survey conducted a decade previously, see Table 2.

[†] Significantly higher than all other specialties ($p < .05$).

[‡] Significantly higher than all other specialties except surgery ($p < .05$).

[§] Significantly higher than all other specialties except internal medicine ($p < .05$).

[‖] Significantly higher than all other specialties except internal medicine and family practice ($p < .05$).

[¶] Significantly higher than all other specialties except obstetrics-gynecology and pediatrics ($p < .05$).

cialties (Table 1). In contrast to social activities, the percentages of programs that offered resident retreats were significantly ($p < .05$) lower in all specialties except psychiatry. Seventy-seven percent or more of the programs in all specialties studied reported formal gripe sessions, while 86% or more involved residents in program or institutional decision making. Professional counselors were on staff with percentages ranging from 86% in family practice to 44% in obstetrics–gynecology. Similarly, the percentages of programs that offered financial benefits for counseling ranged from 70% in psychiatry to 47% in pediatrics. A majority of programs in all specialties offered residents an orientation week or month.

In all the specialties studied, support groups were offered more often for residents alone than for spouses alone or for residents and spouses together. Family practice programs were more likely to offer support groups for residents than any of the other specialties studied ($p < .05$ in all cases). When compared with Berg and Garrard's data, of all the specialties only family practice showed a significant increase in offering support groups for residents (Table 2).

A majority of programs in the specialties studied offered seminars or speakers dealing with emotionally charged medical issues (Table 1). Family practice programs were significantly ($p < .05$) more likely than any other specialty studied to offer these seminars, as well as seminars or speakers dealing with the stresses and

Table 2

Comparison of the Percentages of Residencies in Six Specialties that Offered Specific Support Services in 1979–80 and in 1988–89*

	Family Practice		Internal Medicine		Obstetrics–Gynecology		Pediatrics		Psychiatry		Surgery	
Service	1979–80 ($n = 88$)	1988–89 ($n = 180$)	1979–80 ($n = 81$)	1988–89 ($n = 92$)	1979–80 ($n = 70$)	1988–89 ($n = 53$)	1979–80 ($n = 81$)	1988–89 ($n = 52$)	1979–80 ($n = 82$)	1988–89 ($n = 48$)	1979–80 ($n = 79$)	1988–89 ($n = 68$)
Residency-sponsored social activities	91	94	93	93	80	90	94	93	87	90	85	95
Formal gripe sessions	90	94	72	89	76	77	77	91	88	83	78	78
Professional counselors on staff	83	86	64	71	99	44‡	69	65	76	53	54	58
Financial advisor on staff	57	43	22	17	17	27	20	30	9	8	20	28
Support groups for residents	59	72†	25	30	26	21	37	48	68	58	20	32
Seminars and/or speakers on emotionally charged medical issues	93	93	70	71	67	58	84	83	85	80	63	66
Seminars and/or speakers on stresses and conflicts of being a physician	72	85†	23	34	23	31	19	50†	51	48	22	43†
Part-time residency	13	11‡	27	15‡	16	2‡	25	24	60	40‡	5	0‡
Child care services	7	21†	14	20	10	13	6	22†	9	8	11	24†

*To determine the percentages of training programs that offered each of 19 support services to residents in 1988–89, the authors surveyed a random sample of 576 residencies; 493 responded. The authors then compared their results regarding nine services with those from a survey of 481 programs conducted by other researchers a decade previously, in 1979.

†Significant increase ($p < .05$).

‡Significant decrease ($p < .05$).

conflicts of being a physician and Balint-type seminars. Over the past decade, programs in family practice, pediatrics, and surgery showed significant increases in seminars offered on the stresses and conflicts of being a physician (Table 2).

As shown in Table 1, programs in internal medicine, obstetrics–gynecology, and pediatrics offered significantly more night float rotations (residents working night shifts without daytime responsibilities) than did programs in family practice, psychiatry, and surgery ($p < .05$). Programs in all the specialties studied except obstetrics–gynecology offered mental health days or postcall time off more often than formal night floats.

In the past decade, all specialties except pediatrics have significantly decreased offering part-time residencies (Table 2). During the same period, programs in family practice, pediatrics, and surgery more than doubled their offerings of child care services.

Discussion

Support groups have been particularly effective in providing support for residents.[15–17] When asked to identify support services desired but not present in their programs, family practice residents have identified support groups as most desired.[18] Residents impaired by drug use or emotional illness commonly feel a sense of hopelessness and isolation.[7] Support groups may be particularly useful in combating the isolation perceived by residents. The opportunity to ventilate negative feelings, to share with and to be supported by one's peers, may assist in preventing impairment among some residents.

Five of the six specialties studied offered fewer part-time residencies than a decade previously. Pediatrics residencies, which traditionally have had high percentages of women residents, have not changed significantly their offerings of part-time residencies. Only 5% of the surgery programs offered part-time residencies a decade earlier, and none reported such in 1988–89, while the percentage of such residencies offered by the obstetrics–gynecology programs decreased from 16% to 2%. While part-time residencies have traditionally been occupied by women residents, especially women with children, the decrease in frequency of part-time residencies occurred over a decade in which there has been an increasing percentage of women in medicine, particularly in obstetrics–gynecology. An explanation for the decrease in part-time residencies may lie in the difficulties experienced by program directors in attempting to solve the administrative and scheduling problems created when mixing traditional and alternative residency schedules. An additional explanation may be that the more surgery-oriented specialties have excluded part-time residencies from the rigorous culture of surgery training. Also, residents themselves may have been reluctant to lengthen their training.

It may have been easier for programs to offer residents days off, or portions thereof, than months off (part-time residencies). Programs in all specialties except psychiatry offered more postcall time off or mental health days than part-time residencies. Psychiatry may have stood apart from the other specialties studied because it required less frequent night call and subsequently less need for postcall time off or mental health days. Similarly, it may have been easier to schedule psychiatry residents in part-time residencies that extended beyond the usual course of training, because of an emphasis on continuity with patients rather than monthly rotations.

Over the last decade, there has been a marked increase in the availability of child care services in all specialties studied except psychiatry. The increasing number of women in medicine may, in part, have accounted for this increase. Alternatively, the increase of women, and women with children, in the general work force may have resulted in more child care services offered in institutions sponsoring residencies, thus benefitting medical trainees as a byproduct. Offering child care may be logistically easier for a residency or sponsoring institution than coping with the confusion of scheduling part-time or alternative residencies.

Night floats are a relatively recent change in residency rotation scheduling, and therefore were not surveyed previously. Nonetheless, it is of interest that programs in internal medicine, obstetrics/gynecology, and pediatrics in 1988–89 were significantly more likely to incorporate night floats into their rotation schedules than were family practice, psychiatry, or surgery programs. The low availability in family practice programs may have resulted from one of two factors. First, programs in university hospitals may have found themselves not controlling their own rotation schedules but rather using services controlled by other departments. Second, those programs in community hospitals where family practice was the only training program may have found the need to cover all services with a limited number of residents. This may have precluded the scheduling of a night float rotation without the expense of adding residents. Psychiatry's low availability of night float rotations again may reflect the infrequency of night call. The low frequency of night float rotations in surgery programs may be explained by the use of "24 on/24 off" rotations, or by an emphasis on continuity between resident and patient common to surgery training programs.

A range from 58% to 93% of programs offered seminars and speakers on emotionally charged medical issues, without much change in each specialty over a decade. Family practice, pediatrics, and surgery programs increased the availability, over a decade, of seminars and speakers dealing with the stresses and conflicts of being a physician. The availability of such seminars in psychiatry remained relatively high. The increased availability of these seminars may reflect increased attention to residents' (and ultimately physicians') well-being.

Balint-type seminars[19–23] are named for the British psychoanalyst Michael Balint and can be defined generically as seminars dealing with troubling doctor–patient relationships. Balint-type seminars were offered less frequently than seminars and speakers on either emotionally charged medical issues or the stresses and conflicts of being a physician. The lesser availability of Balint-type seminars may reflect the absence of trained Balint facilitators, less emphasis on dealing with the doctor–patient relationship and "problem patients," or the logistical difficulty of offering ongoing seminars as contrasted to offering episodic lectures.

This survey attempted to highlight support services that the authors presumed to be both prevalent and important for reducing residents' stress and increasing residents' well-being. Other services not surveyed, such as residents' advisors or salary, may also be important in combatting residents' stress. The presence or absence of support services does not necessarily translate into an overall supportive atmosphere for residents. Many other factors, such as the quality of faculty, type of patients, composition of the cohort group, training requirements, and health care economics also can affect residents' well-being.

The results of this survey may have been affected by who responded to the questions. Either program directors and/or department chiefs identified themselves as the respondents to 90% of the questionnaires. Ten percent or less of the questionnaires were filled out by administrative staff or by chief residents. Experience with other surveys has revealed that program directors may identify more support services than do residents.[18] The explanation may lie either in a greater awareness by program directors of what is offered or in identification of more services offered than are practically available to residents.

Because of lack of specificity in the wording of the questions, a respondent's interpretation of a question may have differed from the interpretations of other respondents and of the authors. For example, positive responses to the question about the availability of Balint-type seminars do not discriminate between programs with Balint seminars running a few weeks each year and programs offering weekly Balint seminars over the full three years of residency, nor do such responses describe the resulting impacts such differences may have on residents' support. We hope that further research will address the effects of the availability of support services on residents' stress, support, and well-being.

Conclusion

This study was begun with two questions: First, are there differences between specialties in the amounts and kinds of support services offered to residents? And second, do current levels of support services differ from those of a decade earlier? We found, on the one hand, that the prevalences of residency-sponsored social activities, professional counselors on staff, and seminars and/or speakers dealing with emotionally charged medical issues were high across specialties and consistent over the past decade. On the other hand, the availability of part-time residencies was low in most specialties and diminished over the decade, whereas the availability of seminars and/or speakers on the stresses and conflicts of being a physician and child care services increased markedly over the decade.

Even with increased attention to residents' working hours and supervision and to the potential negative consequences of stressful working conditions to both patients and residents, graduate medical education has much room to improve in its support of residents. With or without mounting external pressure, residencies can choose to implement support services. The authors' hope is that this study will stimulate the voluntary implementation of support services for residents, thus further humanizing graduate medial education and tomorrow's practicing physicians.

The authors acknowledge the assistance of Suzanne Coberly in data acquisition, Neil Willits and Christiana Drake in data analysis, Bob Burack and Marilyn Little in survey design, Margo Addison and Don Ransom in critical commentary, and Judith Garrard for historical perspective. This study was undertaken partially with support from the Department of Health and Human Services, Grant Programs for the Establishment of Departments of Family Medicine, Grant #2 D32 PE 19011.

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AAMC PAPERS

Relationship between Third-year Clerkships in Family Medicine and Graduating Students' Choices of Family Practice Careers

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Academic Medicine
MARCH 1992

Relationship between Third-year Clerkships in Family Medicine and Graduating Students' Choices of Family Practice Careers

DONALD G. KASSEBAUM, M.D., and ROBERT A. HAYNES, Ph.D.

The AAMC's Medical Student Graduation Questionnaire (GQ) continues to show that the third-year clinical clerkships are among the factors significantly influencing students' choices of specialty training and practice. Family practice advocates believe that a third-year clerkship in family medicine will catalyze interest in that specialty,[1-4] although that assumption has not hitherto been validated on a national scale. Babbott and colleagues[5] showed that the majority of students who matched in family practice residencies came from a pool of students who had favored that specialty at the time of taking the Medical College Admission Test (MCAT); yet only 24% of those indicating interest in family practice at the time of the MCAT still showed interest in that specialty on the subsequent GQ. With that in mind, Garrett and Dietrich[6] recently joined the chorus advocating the exposure of students to family physician role models in order to counter influences that might turn students away from their earlier leaning toward family practice. In corroboration, Carline and Greer[7] have reported that in one medical school with a third-year family medicine clerkship 98% of the students who made an early choice of family practice stuck with that decision.

The relationship between required third-year clerkships in family medicine and students' choices of family practice careers has been examined using several AAMC data sources. Accredited U.S. medical schools were categorized according to the presence or absence of a required family medicine clerkship of at least four weeks' duration in the third year under the direction of the department of family medicine (also called family and community medicine/health or family practice). A "primary care" or "ambulatory care" clerkship or preceptorship in the third year was classified as family medicine if the experience was obligatory for all students and predominantly family medicine (as opposed to internal medicine and/or pediatrics). Fourth-year family medicine clerkships, required or optional, were ignored for purposes of this study because they occur generally after students have crystallized their plans for graduate medical training.

The 1990 GQ was examined for senior students' plans for specialty training and certification. Of the 126 accredited U.S. medical schools, 121 were studied: 57 with and 64 without required third-year family medicine clerkships. Five schools were excluded from the study. Four were outliers because, although they did not have required third-year clerkships in family medicine, there was an unusual prominence of family physicians and significant exposure of students to family and community medicine during the introductory clinical experience of the first two years, accompanied by high rates of family practice career choices amongst graduating seniors. The fifth excluded school was the single two-year medical school, and its data were pooled with those from the school in the same state to which these students transfer for clinical education in the third and fourth years.

Students' responses to two items in the 1990 GQ were noted: first choice of family practice residency in the first postgraduate year (PGY-1); and plans to seek certification in family practice as the specialty of first choice.

In addition to the plans that the seniors declared on the GQ, the actual 1991 appointments in family practice PGY-1 residency positions were examined in relation to whether the students graduated from schools with or without required third-year clerkships in family medicine.

While there were responses to the GQ for all schools included in the study, the overall response rate was 75% of all students graduating in 1990. By contrast, all graduates who matched with PGY-1 residency positions in 1991 were accounted for.

Nationally, 10.6% of seniors completing the 1990 GQ indicated that their first choice was a PGY-1 residency position in family practice, and 10.7% indicated that they planned to seek

TABLE 1. Mean Percentages of Senior Students Planning PGY-1 Residencies and Eventual Certification in Family Practice in Schools with and without Required Family Medicine Clerkships, 1990*

	% Graduates	
Type of School	Planning PGY-1 Residencies in Family Practice	Planning Certification in Family Practice
With required third-year clerkship in family medicine ($n = 57$)	15.6	15.5
Without required third-year clerkship in family medicine ($n = 64$)	6.9	7.0

*Source: 1990 AAMC Medical School Graduation Questionnaire

Dr. Kassebaum is vice president, Division of Educational Research and Assessment; Dr. Haynes is research associate in the Section for Operational Studies; both are at the Association of American Medical Colleges, Washington, D.C.

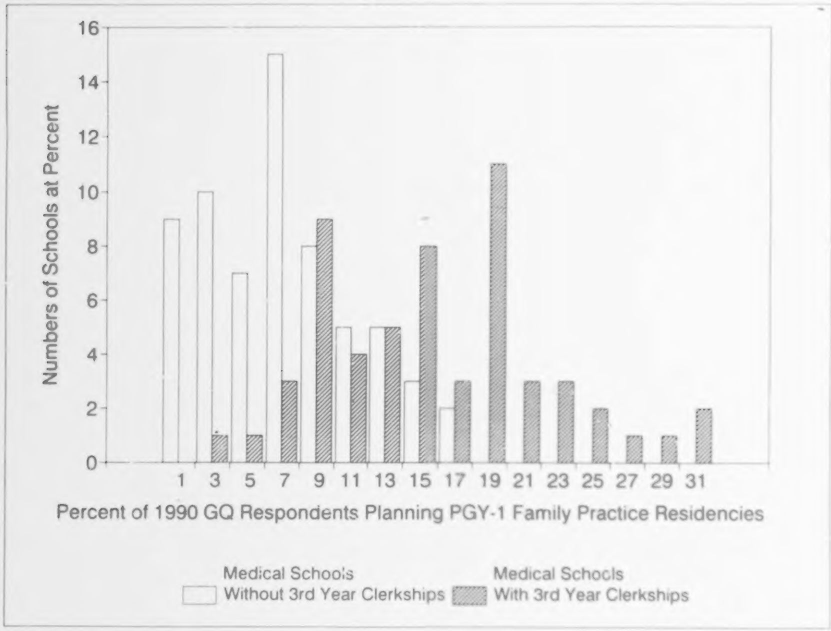

FIGURE 1. Distributions of medical schools, with and without required third-year clerkships in family medicine, according to the percentages of graduating seniors indicating plans for a PGY-1 residency position in family practice on the 1990 Medical Student Graduation Questionnaire.

specialty certification in family practice. For U.S. senior students participating in the National Resident Matching Program in 1991, 10.6% matched in PGY-1 positions in family practice.[8]

Table 1 shows that a mean of 15.6% of the 1990 GQ respondents from schools with required third-year clerkships in family medicine intended to seek family practice PGY-1 residency positions as their first choices, and a mean of 15.5% planned certification in that specialty. In contrast, a mean of 6.9% of the seniors graduating from schools without third-year clerkships intended to seek family practice residency positions as their first

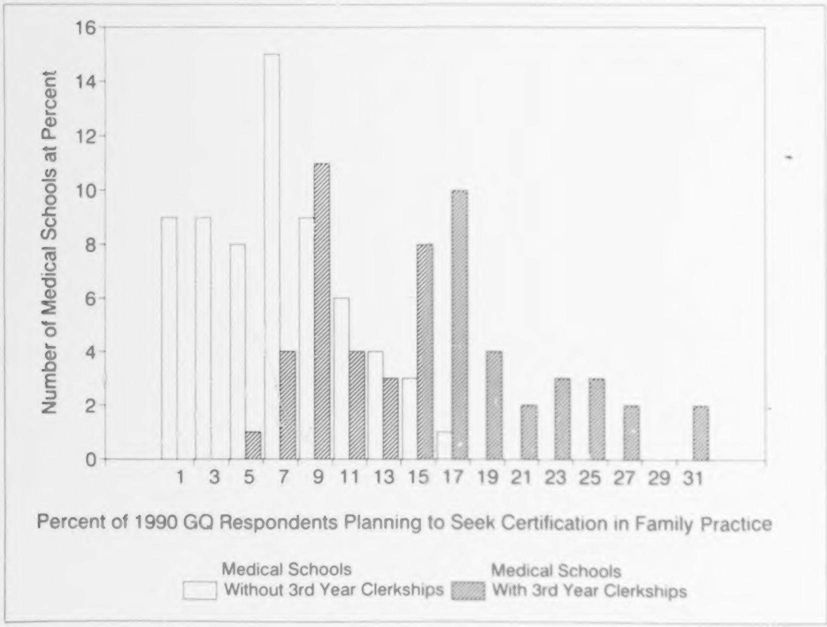

FIGURE 2. Distributions of medical schools, with and without required third-year clerkships in family medicine, according to the percentages of graduating seniors indicating plans for certification in family practice on the 1990 Medical Student Graduation Questionnaire.

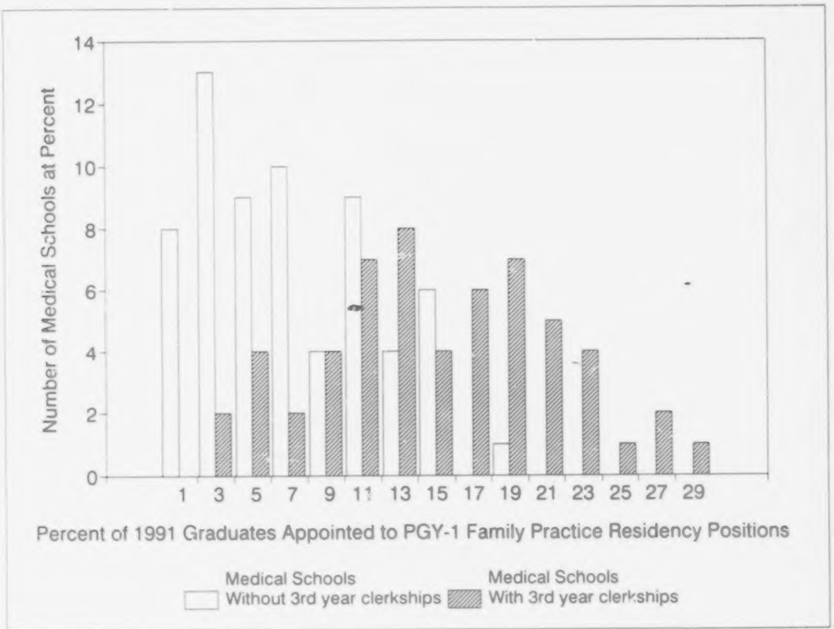

Figure 3. Distributions of medical schools, with and without required third-year clerkships in family medicine, according to the percentages of 1991 graduates appointed to PGY-1 residency positions in family practice.

choices, and a mean of 7.0% planned certification in family practice.

Figures 1 and 2 show the distributions of the medical schools in the study, with and without required third-year clerkships in family medicine, according to the percentages of graduating seniors who indicated plans for a PGY-1 residency position and for specialty certification in family practice. While there clearly are two distributions, related to the presence or absence of a third-year clerkship in family medicine, it is also apparent that in some instances the students' choices were not driven by third-year exposure to family medicine.

Table 2 shows that a mean of 14.7% of graduates of medical schools with required third-year clerkships in family medicine were appointed to PGY-1 family practice residency positions in 1991, compared with a mean of 7.2% of graduates of schools without such clerkships.

Figure 3 shows the distributions of medical schools, with and without required third-year clerkships in family medicine, according to the percentages of 1991 graduates appointed to PGY-1 residency positions in family practice. The distributions are similar to those derived from students' plans indicated on the GQ.

Table 2. Mean Percentages of Graduates Appointed in 1991 to PGY-1 Residency Positions in Family Practice Who Trained at Schools with and without Required Family Medicine Clerkships

Type of School	% Graduates Appointed to PGY-1 Residencies in Family Practice
With required third-year clerkship in family medicine ($n = 57$)	14.7
Without required third-year clerkship in family medicine ($n = 64$)	7.2

The presence of a department of family medicine at a given school was not itself a determinant; two-thirds of the schools without required third-year family medicine clerkships have departments of family medicine and graduate medical education programs in family practice.

While not a panacea, a required third-year family medicine clerkship of at least four weeks is associated with a higher percentage of students choosing training and specialty certification in family practice. The data do not differentiate whether the clerkship reinforces pre-existing interest or inspires it de novo.

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JUNE 1992

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Special Article 357 **Modelling the End of Mandatory Retirement for U.S. Medical School Faculty,** by PAUL J. FRIEDMAN, M.D.

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

JUNE 1992
VOLUME 67
NUMBER SIX

ACADEMIC MEDICINE

JOURNAL OF THE
ASSOCIATION OF
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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year ($40.00/1 year students); $130/2 years; $185/3 years; and $7.00 per single copy.

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Manuscripts: The Editor, *Academic Medicine*, Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037.
Advertising: Diane Sherel, Advertising Manager, Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, PA 19107; (215) 546-0313.
Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
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AAMC DATA REPORT

Results of the National Resident Matching Program for 1992

The number of U.S. seniors who enrolled in the NRMP in 1992 decreased by 66 to 15,202. The number of U.S. seniors who subsequently withdrew did not change significantly. A total of 12,957 U.S. seniors were matched into PGY1 positions for a match rate of 92.4%, compared with 93.1% in 1991. This was the largest percentage of unmatched U.S. seniors (7.6%) since 1984, when 7.8% were unmatched. This is the first time the unmatched rate has been greater than 7% since 1985. The number of U.S. foreign medical graduate (U.S. FMG) applicants continued to decline from a peak of 2,922 in 1984. In 1992, there were 983 U.S. FMG applicants and 366 subsequently withdrew from the Match. In 1986 the match rate for U.S. FMG applicants was 38.6% and has steadily increased each subsequent year. In 1992, 58.7% of the U.S. FMG applicants were matched to PGY1 positions. (U.S. FMGs are U.S. citizens who obtained their degrees from foreign medical schools.) The foreign-born foreign medical graduate applicants (alien FMG applicants) increased by 1,554, an increase of 38.1% since 1991. Of the alien FMG applicants, 43.2% withdrew from the Match, a slight decline from 1991, when 44.5% of the alien FMG applicants withdrew from the Match. These large withdrawal rates suggest that some alien FMG applicants obtain positions outside of the Match. Of the 3,196 active alien FMG applicants, 2,014 (63.0%) were matched to PGY1 positions. In 1985 the match rate for alien FMG applicants was 21.6%, with steady increases until 1991. The 1992 match rate was slightly lower than in 1991 (63.4%) and marks the first decline in the match rates of alien FMG applicants since 1985. (Alien FMG applicants are non-U.S. citizens who obtained their degrees from foreign medical schools.)

The number of PGY1 positions offered increased by 1% to 20,394. The largest increase in the number of positions offered occurred in emergency medicine, with an increase of 18%. The number of positions offered in the surgical specialties also increased slightly, to 685 from 647 in 1991, as a result of the increases in orthopedic surgery, plastic surgery, and urology. While the total number of positions offered in internal medicine remained unchanged at 7,403, the distribution of positions changed. The number of preliminary internal medicine positions offered declined by 97 (4.7%), while there was a 7.3% increase in the number of primary care internal medicine positions offered.

The number of U.S. seniors matched to positions in family practice, obstetrics–gynecology, and psychiatry increased in 1992. The increased number of U.S. seniors matched into the support specialties was primarily a result of the increases in emergency medicine. The increase in the number of U.S. students matched into positions in the surgical specialties was primarily a result of the increases in orthopedic surgery. The number of U.S. seniors matched into positions in general surgery and pediatrics was unchanged. The number of U.S. seniors matched into positions in categorical internal medicine or preliminary internal medicine programs decreased, but the number increased in primary care internal medicine.

The fill rate for total applicants decreased slightly from 84.9% in 1991 to 83.3% in 1992. Total applicant match rates increased in family practice, general surgery, pediatrics, and preventive medicine. The increases in match rates can be attributed to the increase in the match rates of FMGs in family practice and pediatrics. The total applicant match rates decreased in psychiatry, anesthesiology, physical medicine, nuclear medicine, and transitional year programs. Total applicant match rates remained relatively unchanged in obstetrics and gynecology, urology, plastic surgery, emergency medicine, orthopedic surgery, pathology, diagnostic radiology, and therapeutic radiology. Among internal medicine programs, total applicant match rates increased in the categorical, primary care, and preliminary programs. The increase in the total applicant match rate in categorical internal medicine was primarily a result of the massive increase in the match rate of FMG applicants. The increased match rates in family medicine, pediatrics, and primary care internal medicine may signal a reversal in the declining match rates of the primary care specialties.

An increased number of advance programs for students (PGY2) were offered in the Match this year. Applicants matching to these positions will do a year of broad clinical training—generally in internal medicine, general surgery, or a transitional year—before entering advanced positions in 1993. There were 334 programs that offered 1,954 positions, of which 1,299 were filled by U.S. seniors and 219 were filled by other applicants, mainly FMGs. Advanced positions allow matched applicants to link their first year of training (PGY1) with their advanced positions in such a manner that a physical move from one locale to another can be avoided.

There were 122 PGY2 programs in anesthesiology that offered 1,020 advanced positions, an increase of 57 positions from 1991. Of the advanced positions, 66.9% were filled by U.S. seniors, compared with a 72.5% fill rate by U.S. seniors in 1991. Nineteen programs in emergency medicine offered 146 advanced positions, of which 65.1% were filled by U.S. seniors and 84.9% were filled by all applicants, compared with fill rates of 68.5% for U.S. seniors and 82.1% for all applicants in 1991.

There were 922 applicants who participated as 461 couples in the 1992 Match, an increase of 84 couples. Both partners were matched in 89.4% of the 461 couples.

Data describing the trends in positions offered and filled by U.S. seniors and other applicants during the past several years are published annually in *NRMP Data*, available upon written request from the National Resident Matching Program, Suite 201, 2450 N Street, N.W., Washington, DC 20037-1141.

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Table 1

Participation in the National Resident Matching Program in 1992

Category	U.S. Senior Students		Other U.S. and Canadian Students*		U.S. Foreign Graduates		Foreign-born Foreign Graduates		Total Applicants	
	No.	%	No.	%	No.	%	No.	%	No.	%
Total applicants	15,202	100.0	2,817	100.0	983	100.0	5,629	100.0	24,631	100.0
Withdrew	1,172	7.7	1,141	40.5	366	37.2	2,433	43.2	5,112	20.8
Active participants	14,030	92.3	1,676	59.5	617	62.8	3,196	56.8	19,519	79.2
Matched PGY1	12,957	92.4	930	55.5	362	58.7	2,014	63.0	16,263	83.3
Unmatched PGY1	1,073	7.6	746	44.5	255	41.3	1,182	37.0	3,256	16.7
Total	14,030	100.0	1,676	100.0	617	100.0	3,196	100.0	19,519	100.0

*Other U.S. and Canadian students consist of graduates from U.S. osteopathic schools and Canadian medical schools; physician candidates, that is, earlier U.S. graduates seeking a position in graduate medical education; and "fifth pathway" students, who are U.S. nationals who have completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship.

Table 2

Positions Offered and Filled by Types of Applicants in 1992

			Applicants Matched												
	PGY1 Positions Offered		U.S. Senior Students			Other U.S. Applicants‡			Foreign-born Foreign Graduates			Total Applicants		
				%			%			%			%	
Specialty	No.	%*	No.	*	†	No.	*	†	No.	*	†	No.	*	†
Family practice	2,486	12.2	1,398	10.8	56.2	157	12.2	6.3	123	6.1	4.9	1,678	10.3	67.5
Internal medicine	7,403	36.3	4,429	34.2	59.8	414	32.0	5.6	1,228	61.0	16.6	6,071	37.3	82.0
Pediatrics	2,068	10.1	1,325	10.2	64.1	102	7.9	4.9	268	13.3	13.0	1,695	10.4	82.0
Obstetrics-gynecology	1,109	5.4	945	7.3	85.2	101	7.8	9.1	25	1.2	2.3	1,071	6.6	96.6
Psychiatry	1,082	5.3	526	4.1	48.6	88	6.8	8.1	81	4.0	7.5	695	4.3	64.2
General surgery	2,203	10.8	1,528	11.8	69.4	114	8.8	5.2	140	7.0	6.4	1,782	11.0	80.9
Orthopedic surgery	506	2.5	455	3.5	89.9	42	3.3	8.3	5	0.2	1.0	502	3.1	99.2
Anesthesiology	352	1.7	244	1.9	69.3	13	1.0	3.7	16	0.8	4.5	273	1.7	77.6
Emergency medicine	569	2.8	439	3.4	77.2	92	7.1	16.2	3	0.1	0.5	534	3.3	93.8
Pathology	518	2.5	254	2.0	49.0	25	1.9	4.8	40	2.0	7.7	319	2.0	61.6
Physical medicine	112	0.5	71	0.5	63.4	6	0.5	5.4	0	0.0	0.0	77	0.5	68.8
Preventive medicine	14	0.1	5	0.0	35.7	0	0.0	0.0	1	0.0	7.1	6	0.0	42.9
Diagnostic radiology	398	2.0	316	2.4	79.4	65	5.0	16.3	9	0.4	2.3	390	2.4	98.0
Transitional	1,324	6.5	847	6.5	64.0	56	4.3	4.2	68	3.4	5.1	971	6.0	73.3
Other§	250	1.3	175	1.4	70.0	17	1.4	6.8	7	.5	2.8	199	1.1	79.6
Total	20,394	100.0	12,957	100.0	63.5	1,292	100.0	6.3	2,014	100.0	9.9	16,263	100.0	79.7

*Percentage distributions of positions offered and filled among specialties (percentages may not add to 100 due to rounding).

†Percentage of positions offered in specialty that were filled by applicants.

‡This category consists of those students listed in the footnote to Table 1 plus U.S. foreign medical graduates.

§Some specialties include only a small number of available positions in the Match because the majority of positions are filled without a Match, or the specialties use an earlier Match system. These specialties are dermatology, neurology, ophthalmology, neurosurgery, otolaryngology, urology, plastic surgery, radiation oncology, and nuclear medicine.

JULY 1992

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VOLUME 67 • NUMBER SEVEN

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Publishing Services: Hanley & Belfus, Inc
210 South 13th Street, Philadelphia, PA 19107

JULY 1992
VOLUME 67
NUMBER SEVEN

ACADEMIC
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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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ORIGINAL CONTRIBUTIONS

ARTICLES

Recommendations for Changing the Residency Selection Process Based on a Survey of Program Directors

NORMA E. WAGONER, Ph.D., and J. ROBERT SURIANO, Ph.D.

Abstract—The authors conducted a nationwide survey of program directors participating in the 1990–91 National Resident Matching Program (NRMP) in order to solicit the directors' responses to elements of the current residency selection process and to suggested revisions. Of 680 randomly selected directors, 469 (69%) responded to the survey questionnaire, using a five-point scale, from 1, indicating strong agreement, to 5, indicating strong disagreement. The directors agreed that the senior year was distorted by the selection process, that students were pressured into making early career decisions, and that there needed to be more structure to the senior year. The directors were also in agreement that interviews, the NRMP, and the uniform notification date were working well. But deans' letters, other letters of recommendation, the Universal Application, and appointment of unmatched students were considered to be in need of improvement. The development of a centralized residency application service with the electronic transmission of data received the directors' support. The authors recommend that a task force be convened to consider changes that would improve the selection process and would reduce disruption of the students' senior year of medical education. *Acad. Med.* 67 (1992): 459–465.

During the last several years, there has been an increasing desire to improve the quality of the senior year of medical school by reducing the disruption caused by the redundant and excessive requirements of a demanding residency selection process. There has been a desire not only to improve the efficacy of the selection process but also to assure that program directors receive significant information about their applicants at an appropriate time.[1]

In 1988, the Association of American Medical Colleges' (AAMC's) Committee on Graduate Medical Education provided guidelines for the content and format of deans' letters in order to provide better and more standardized evaluative information.[2] At the same time, the Council of Deans sanctioned the November 1 release data for the dean's letter.

Several areas of the residency selection process warrant consideration for revision that might improve the process. Based on our experience, we identified the following areas as being appropriate for further investigation:

1. *Further improvement of the content of deans' letters.*[3–5] The magnitude of the task involved in the preparation of the dean's letter and its mailing on a given date requires the allocation of significant resources. This can be justified only if program directors find the content sufficiently valuable to use in their selection process.

2. *Transmission of the dean's letter at a time suitable for decision making by program directors.* The current date for transmission of the dean's letter has led some program directors to schedule interviews before they receive deans' letters.

3. *Assessment by program directors of the predictive value of scores on the MCAT (Medical College Admission Test) and on the ACT (American College Testing) Assessment or SAT (Scholastic Aptitude Test).* Requests for MCAT scores and SAT or ACT scores have been on the rise among program directors in surgery subspecialties. Often students are required to mail an increasing number of "certified" copies of scores. Now that the National Board of Medical Examiners provides only a single score on its United States Medical Licensing Examination, will there be an increasing number of program directors who will seek high school, college, or other premedical data?

4. *Development of guidelines to improve the quality of the selection interview.*[6] Many students report being questioned about family plans and other personal matters in a manner that may have questionable legality.

5. *Development of a system to schedule interviews.* Directors faced with large numbers of places to fill and many applications to process,

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and who value the dean's letter as integral to selecting students for interviews, find that the timing tends to place interviews during the Thanksgiving, Christmas, and New Year's Day holidays, which are not only the most expensive times to travel, but also are difficult ones for the securing of sufficient faculty to do the interviews. A system also would facilitate better use of student time, and would enable fuller use of the senior year while reducing costs.

6. *Adoption of an improved Universal Application.*[7] Choice of the Universal Application by directors has been highly variable. When program directors have selected the Universal Application, students appreciate that their time is made more efficient. When students receive a variety of applications, they often complain that they must provide the same information in several different ways. In addition, information that the student has provided on the curriculum vitae or personal statement is often required on applications in ways that are redundant. Students question why the curriculum vitae and the personal statement could not be an integral part of the Universal Application.

7. *Reevaluation of the role of audition electives.*[8-10] Results of the 1990 AAMC Medical Student Graduation Questionnaire[11] show that nearly 30% of the responding students were encouraged to take a specialty rotation in the institution where they hoped to be considered, in order to enhance their chances for the residency position. 1990 AAMC questionnaire data denote that 12.3% of the students took two or more electives at institutions other than their own schools.

8. *Development of a system for the unmatched student.* The unmatched-student process has been described as "chaotic and unfair" by students, program directors, and deans of students. A significant number of decisions are being made via telephone on the day before the Match. However, more information is now being demanded of candidates from some specialties, and entire files are now being requested via fax, with resultant "fax jam." In some instances, students are requested to travel to programs for interviews, creating more expense and less timeliness in the unmatched-student process.

We then surveyed program directors regarding their views about the concerns we had identified. The survey acquired particular importance because program directors have no formal representative organization and any changes to the residency selection process would necessarily require input from all constituencies. This was the first survey of a broad range of program directors on the topic of considering further modifications to the selection process.

Method

A questionnaire was developed that centered on the identified concerns, and it was mailed in July 1990 to 680 randomly selected program directors who were participating in the 1990–91 National Resident Matching Program (NRMP). In order to obtain a representative sample of the participating programs, we chose every other program director from an alphabetical list of a total of nearly 1,400. Care was taken to avoid any selectivity bias toward university or community hospitals. All specialties were sampled.

Responses were obtained from programs representing every specialty participating in the NRMP, including 32 directors of medical education. The questionnaire was designed to address issues pertinent to the directors' degrees of satisfaction or dissatisfaction with the residency selection process and whether they were interested in using advanced technology to develop a more streamlined process. The questionnaire allowed for open-ended comments. These comments provided additional valuable insights about program directors' concerns. Preliminary results were reported at the October 1990 AAMC annual meeting's Forum on the Transition from Medical School to Residency. The final results are contained in this report.

The program directors were asked to respond to each question using a five-point Likert scale, where 1 represented strong agreement, 3 represented neither agreement nor disagreement, and 5 indicated strong disagreement. The program directors were asked to rate statements under each of the following headings: (1) general overview of the major elements of the residency selection and application process, (2) the dean's letter, (3) the Universal Application, (4) the impact of the process on undergraduate medical education, (5) the cognitive selection parameters, (6) the interview, and (7) possible future developments.

The response rate was 68.9% with 469 program directors returning surveys. All the responses were combined for analysis, independent of specialty or hospital type. For each item, a mean response was calculated and used to assess the degree to which the program directors expressed agreement or disagreement on the particular components of the residency selection process.

Results and Discussion

If there is a consensus that the residency selection process has a disruptive influence on undergraduate medical education, then appropriate corrective measures ought to be implemented as expeditiously as possible. The results of our survey show that there is such an agreement now.

Table 1 shows the directors' mean responses and the percentages of their responses in the order of strength of agreement to issues concerning the residency selection process. A neutral mean response (2.93, SD, 0.87) was obtained to the question of whether students arrive at their residency program with well-integrated clinical knowledge. Many program directors evidently assessed their new residents as deficient in this area. It would be natural to question whether students' concerns during the senior year to complete a large number of different application forms, take several audition electives, and devote considerable time over two to three months to interviewing

Table 1

Mean Ratings and Percentages of Responses to Issues Concerning Residency Selection, as Reported by a National Sample of 469 Program Directors in the 1990–91 NRMP*

Item	% Respondents Giving Rating					Mean Rating	(SD)
	Strongly Agree: 1	Agree: 2	Neutral: 3	Disagree: 4	Strongly Disagree: 5		
Senior year distorted by selection process	31	37	22	6	4	2.14	(1.04)
More structure needed in senior year	29	38	23	7	3	2.18	(1.03)
Students pressured too early for career choice	35	26	21	15	4	2.28	(1.20)
Lack of coordination in process leads to loss of educational time	20	35	32	11	3	2.42	(1.01)
Residents begin with well-integrated clinical knowledge	3	30	42	22	3	2.93	(0.87)

*In July 1990 the authors conducted a nationwide survey of program directors participating in the National Resident Matching Program (NRMP) in order to solicit the directors' responses to elements of the current residency selection process and to suggested revisions. Of 680 randomly selected directors, 469 (69%) responded to the authors' questionnaire. The table above shows the directors' responses concerning major issues involving the selection process, in order of strength of agreement. All percentages are rounded.

has a deleterious effect on students' abilities to integrate clinical knowledge.

When program directors were asked if they felt the senior year was distorted by the selection process, the mean response (2.14, SD, 1.04) was one of agreement. It was not surprising that the directors wanted more structure in the fourth year (2.18, SD, 1.03). Many of the program directors counseled senior medical students, and when asked whether seniors were pressured too early into making career decisions, their mean response was one of agreement (2.28, SD, 1.20).

For most medical schools, the residency selection process begins in the junior year as students select fourth-year electives. The process intensifies as the students move into the senior year, and it continues until the Match lists are entered into the National Resident Matching Program's (NRMP's) computerized Rank Order List Input and Confirmation System (ROLIC), usually ten or 11 months later. For students applying to specialties outside the NRMP, more time is needed to obtain both first-year and second-year positions. Students in general are often limited to participating in fewer stringent electives during the months of December and January, but for those students applying outside the NRMP, November is included as well. When asked about the lack of coordination of the residency selection process and whether this created lost educational time for students, program directors agreed (2.42, SD, 1.01).

Table 2 shows the program directors' mean responses and the percentages of their responses to whether

Table 2

Mean Ratings and Percentages of Responses to Whether General Elements of the Residency Selection Process Work Well, as Reported by a National Sample of 469 Program Directors in the 1990–91 NRMP*

Item	% Respondents Giving Rating					Mean Rating	(SD)
	Strongly Agree: 1	Agree: 2	Neutral: 3	Disagree: 4	Strongly Disagree: 5		
Interviews	53	34	10	2	1	1.65	(0.83)
Notification of Match results	42	39	12	5	2	1.85	(0.93)
National Resident Matching Program	36	39	17	6	3	2.01	(1.01)
Interview time frame: Nov. 1–Feb. 1	22	43	16	13	6	2.38	(1.14)
Dean's letter	15	40	28	12	4	2.51	(1.03)
Other letters of support	10	37	34	16	2	2.64	(0.95)
Use of NBME scores	12	35	34	15	3	2.66	(1.37)
Universal Application	18	29	28	17	8	2.68	(1.19)
Unmatched-student process	11	31	31	18	9	2.83	(1.12)
Early specialty matches (non-NRMP)	9	18	30	22	21	3.28	(1.24)

*In July 1990 the authors conducted a nationwide survey of program directors participating in the National Resident Matching Program (NRMP) in order to solicit the directors' responses to elements of the current residency selection process and to suggested revisions. Of 680 randomly selected directors, 469 (69%) responded to the authors' questionnaire. The table above shows the directors' responses concerning whether general elements of the process work well, in order of strength of agreement. All percentages are rounded.

general elements of the residency selection process were working well. Previous studies by the authors[3,10,12] revealed that the interview process was considered to be very important in providing information essential to resident selection. In the current questionnaire, program directors were asked if they perceived interviews to be working well. Their mean response (1.65, SD, 0.83) was one of the strongest responses of agreement obtained. However, many program directors offered comments regarding the mechanics of the process, explaining that interviewing, in the words of one director, was "extremely time consuming, and that it was often difficult to be fair when so many applicants were applying for so few places." The timing of interviews from November 1 to February 1 appears to have been supported (2.38, SD, 1.14), although several program directors thought it was "horrible," "dragged out the season" and "needed to be shortened further."

When asked whether the dean's letter served them well, the directors gave a mean response that approached neutrality (2.51, SD, 1.03). In other areas, such as other letters of support (2.64, SD, 0.95), use of NBME scores as supportive in the selection process (2.66, SD, 1.37), and the use of the Universal Application (2.68, SD, 1.19), the mean responses were similar to those for the dean's letter, suggesting that more effort was needed to improve these areas. The notification of Match results (1.85, SD, 0.93) and the NRMP (2.01, SD, 1.01) were considered to be working well.

The processes outside the NRMP were considered to work less well. The mean response to a question about the unmatched-student process suggests a low level of satisfaction (2.83, SD, 1.12). Some program directors commented that the process was brutal and haphazard. When questioned about how well the early non-NRMP specialty matches served them, the directors gave a mean response that suggests this area was not working well (3.28, SD, 1.24), although it should be noted that 92 of the 469 program directors (20%) chose not to answer this question. National discussions have tended to produce an awareness among participants and non-participants of the NRMP that having two separate processes may not serve senior medical students well.

Means were also calculated for the directors' responses regarding certain detailed aspects of the residency selection process. The program directors agreed that interviews should be flexible in order to accommodate interviewees' schedules (2.05, SD, 1.06). Comments provided by many directors indicated that they would like to be more accommodating to students' schedules; however, interviewing 80–100 candidates during a limited time span often precluded being more flexible.

When program directors were asked about the importance of determining marital status or family plans during the interview, the mean responses was more neutral (2.93, SD, 1.33). Several directors stated that these questions were illegal or they could not ask them of applicants, although the 1990 AAMC Medical Student Graduation Questionnaire showed that more than 35% of students reported being questioned about these issues. More than 38% of women applicants reported being asked about becoming pregnant during residency.

When asked to agree or disagree with the need for structured interview guidelines, the program directors disagreed (3.29, SD, 1.31). Some made comments, such as "Who would develop?" or "Let me make my own." Responses of the latter type perhaps indicate lesser understanding of the nature of structured interviews.[13,14] Such interviews undoubtedly appeared overly constraining for these directors' purposes. Discussion of interview questions at the 1990 AAMC Forum on the Transition from Medical School to Residency brought forward a request for the delineation of those areas of inquiry that are inappropriate. The directors were encouraged to develop their own criteria and devise appropriate question banks for each criterion, in order to increase both validity and reliability in the interview process.[15]

The directors gave more positive responses when asked about the importance of the dean's letter in selecting candidates (2.44, SD, 1.11) and in rank-ordering candidates (2.58, SD, 1.10). However, five directors commented, "get real," and three others said, "only with negative information." Moreover, when asked to agree or disagree that the dean's letter provides creditable information (2.72, SD, 1.00), or was of the appropriate length (2.72, SD, 1.00), or had the appropriate content (2.78, SD, 1.01), there was less of a general perception that the dean's letter worked well. These responses continue to reaffirm the need for increased improvement in deans' letters. A substantial number of directors commented on the high degree of variability in these letters, thus making generalizations about their usefulness difficult. Other comments provided by program directors stated that deans' letters were "too non-critical," "too vague," "too diffuse," or "too often selling students." Since the questionnaires were distributed before the release of dean's letters, we were unable to discern the effectiveness of the AAMC's recommended guidelines on deans' letters.

The program directors responded that letters of recommendation from three faculty were sufficient (1.87, SD, 0.91). However, to the statement that faculty letters were important in the selection process, the directors gave a more neutral response (2.49, SD, 1.00). A comparable mean was obtained regarding the importance of faculty letters in the ranking of students (2.53, SD, 1.01). The credibility of these letters as important source documents produced a similar outcome (2.66, SD, 0.98). Several directors commented that, like deans' letters, these letters were very good when the letter writers knew the students well. The program directors tended to have a more neutral position on having one of the three faculty letters be from a chairman (2.73, SD, 1.33), with comments like "How many students really know chairmen?" Letters outside of the student's specialty were considered to be less helpful (2.84, SD, 1.04).

The use of cognitive data, such as NBME comprehensive Part I and Part II examination scores, MCAT scores, and SAT or ACT scores, in the residency selection process was assessed. When the directors responded to the statement that Part I scores assisted in candidate selection, the mean response was close to neutral (2.82, SD, 1.10). When responding to the statement that Part I scores correlated with residency performances, there was even less agreement (3.07, SD, 1.01). Since not all students take the fall administration of Part II, the scores are not available at the time of interview or ranking. The mean response to the statement that Part II scores assisted in the selection process (2.84, SD, 1.00) was similar to the response for Part I scores. Since there was more agreement among directors that residency performance correlated with Part II scores (2.78, SD, 0.95) than with Part I scores, the program directors might have felt that Part II scores would have been more valuable if they had been uniformly available at the time of selection. Use of the MCAT in the selection process has been occurring in some surgery specialties, and thus for those who used it, it was ranked highly; the weight of all others who did not use it, however, lowered the mean response to the statement that MCAT scores assist in candidate selection (3.95, SD, 1.01). The program directors agreed about the lack of usefulness of SAT or ACT scores in assisting in candidate selection (4.11, SD, 0.97). However, even with the strong agreement about their not being useful, some responses indicated that there were apparently program directors who used these data.

Table 3 provides the results of the program directors' ratings of suggested changes in the residency selection process, particularly those changes concerning the introduction of new technology and the development of a new, centralized residency application service (RAS). Regarding the desirability of the RAS, the directors' mean response was 2.70, SD, 1.08; for interviews to be scheduled by a computer center, the mean was 3.49, SD, 1.30; and for the application process to use modern technology, the mean was 2.74, SD, 0.98. Similar support was expressed for letters' being sent electronically (2.67, SD, 1.21) and for supplemental questions to be developed by individual programs (2.52, SD, 1.10). The area of strongest agreement was with the statement that the RAS should provide transcript verification (2.30, SD, 1.16). The program directors believed that the unmatched-student process could

Table 3

Mean Ratings and Percentages of Responses Concerning Possible Revisions to the Residency Selection Process, as Reported by a National Sample of 469 Program Directors in the 1990–91 NRMP*

	% Respondents Giving Rating						
Item	Strongly Agree: 1	Agree: 2	Neutral: 3	Disagree: 4	Strongly Disagree: 5	Mean Rating	(SD)
Residency application service (RAS) should verify transcript for programs	29	35	20	11	6	2.30	(1.16)
With verification, RAS should send final transcripts to programs	22	36	24	11	8	2.48	(1.17)
Unmatched students could be handled by RAS	25	30	23	13	9	2.51	(1.25)
Supplemental support questions could be developed by individual programs	18	33	34	8	7	2.52	(1.10)
Applicants should be linked to RAS by computer	17	37	28	12	7	2.56	(1.11)
By Dec. 1 applicants should be notified whether they will receive interview	24	31	17	17	11	2.60	(1.31)
Courses and grades should be added to the Universal Application (UA)	19	30	25	17	8	2.64	(1.20)
Letters should be sent via computer to programs	18	31	28	13	11	2.67	(1.21)
RAS is desirable	12	36	31	14	8	2.70	(1.08)
Application process should use modern technology	8	36	33	19	4	2.74	(0.98)
Curriculum vitae information should be added to UA	18	30	21	19	11	2.75	(1.27)
Applicants receiving interview should be notified by a set date	20	30	20	18	13	2.76	(1.32)
Applicants should be interviewed during a six-week period	15	20	15	27	24	3.24	(1.40)
Interviews should be scheduled by a computer center	9	16	19	28	28	3.49	(1.30)

*In July 1990 the authors conducted a nationwide survey of program directors participating in the National Resident Matching Program (NRMP) in order to solicit the directors' responses to elements of the current residency selection process and to suggested revisions. Of 680 randomly selected directors, 469 (69%) responded to the authors' questionnaire. The table above shows the directors' responses — in order of strength of agreement — regarding suggested changes in the process, particularly those involving the development of a new, centralized residency application service. All percentages are rounded.

be handled by the RAS (2.51, SD, 1.25), although many of them commented that the dean of students needed better information about program openings.

The program directors provided responses that tended toward neutrality when they were asked about future changes regarding the interview process (also shown in Table 3). Notifying all applicants no later than December 1 about whether they would be interviewed was seen as somewhat problematic (2.60, SD, 1.31). Several directors commented that this was too rigid a time frame and that for programs receiving hundreds of applications, particularly from non-U.S. students, it was not possible to review these in such a short time span. Several directors noted that adhering to this deadline would be possible only if November 1 was set as the date for receipt of all applications. When asked about interviewing all students over a six-week period, the program directors were far less supportive of this change (3.24, SD, 1.40). A typical comment from a director indicated that this time frame would "kill us and the students." Others said that they "wouldn't have enough faculty to do the job." Several stated that "eight to 12 weeks would suffice."

As shown in Table 3, a suggestion for adding courses and grades to the Universal Application received a mean response of 2.64, SD, 1.20, and a suggestion to add data from curricula vitae to the Universal Application received a mean response of 2.75, SD, 1.27.

Conclusions and Recommendations

There are many reasons to consider revision of the residency selection process, and we strongly recommend that the AAMC convene a task force on graduate medical education that would include program directors, residents, deans of students, and current senior medical students in order to consider selection process issues. The current cost of education, the need to use the senior year wisely, the inability of students to have budgeted dollars for interview travel, the relative values of the various kinds of information provided by the schools and their students in support of the interview or ranking process, and the unmatched-student process all need to be viewed with an eye for change. Considerable advances in technology have now opened areas of exploration that were not available previously. Based upon the analysis of the results of this study, we recommend that the task force consider the following:

1. The development of a residency application service (RAS) that would receive copies of a modified Universal Application located on computer disks at students' schools. An official password for each student would enable the student to enter only his or her own data at a computer terminal. For those who do not have access to a computer terminal, paper applications would be submitted to RAS. Grades would be listed on the application, and the student would be required to submit an official transcript from the medical school. The RAS would verify transcript information. The application process would have deadlines set by programs.

2. The verified application would then be forwarded to programs electronically by the RAS, or paper copies would be sent to programs that did not have modem capabilities. Each program would send to applicants (either to prescreened candidates only or to all) supplemental materials and a request for photograph (optional), additional questions particular to the specialty, and some notation of the program's interview schedule.

3. When requested, a school would electronically transmit or mail letters of support to the programs where the student was being considered. The dean's letter would likewise be transmitted or mailed at the appropriate release date to the same programs.

4. The program would directly notify each candidate whether he or she would be interviewed, during an eight-week period, and would provide the candidate with a code to contact a centralized computer service to reserve an available interview time. This process would be similar to that offered by airlines or hotels. Once a time is selected, a confirmation notice would be mailed to the candidate by the program. This should enable program directors and students to have scheduling control over the interview process.

5. A new system to simplify the appointment of the unmatched student to an unfilled program position must be developed. After receiving notification of an unmatched student, the school would electronically transmit the dean's letter and three faculty letters of recommendation to the RAS, thereby creating a complete file for every unmatched student. Unmatched students would be expected to indicate to the RAS those programs to which they wished to apply. Over a predetermined period of time, the RAS would electronically transmit the student's complete application file to the appropriate programs. After a nationally agreed upon period of time, program directors would electronically transmit their rank-ordered lists of candidates to the RAS. A second match would be run, and programs and students would be required to accept positions obtained through this process. Any remaining unmatched students would be provided a list of openings to contact.

These proposals would significantly expedite the residency selection process by eliminating redundant paperwork, and they would ease the timely transmission of information. The Canadian Match System, although operating with many fewer applicants, uses a centralized application process. Undoubtedly lessons could be learned from their experience. The realization of our proposals would have to take into account many independent applicants in addition to U.S. medical students. Although the complexity of the change being proposed is sizeable, it seems propitious that change be considered at this time, and it is certain that a large number of people would stand to benefit.

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Effects of Tutors with Case Expertise on Problem-based Learning Issues

CHRIS J. EAGLE, M.D., PETER H. HARASYM, Ph.D., and HENRY MANDIN, M.D.

Abstract—At the University of Calgary Faculty of Medicine in 1991, the authors sought to determine the effects of tutors' levels of content expertise on learning issues generated within problem-based learning (PBL) tutorials. For an integrative course taken prior to clinical clerkships, the 70 students in the class of 1992 divided into ten small groups, which were facilitated alternately by content experts and non-experts. The authors found that—across 35 simulated-patient case encounters (24 with non-experts and 11 with experts)—when the groups had tutors with expertise in the clinical cases studied, the groups generated approximately twice as many learning issues per case, and these issues were approximately three times more congruent with the case objectives. In addition, when the groups had expert tutors they spent approximately twice as much time per case in overcoming identified learning deficiencies. The authors conclude that it is important for tutors (1) to be well informed about cases and case objectives and (2) to be well versed in the PBL tutoring process. *Acad. Med.* 67(1992):465-469.

Traditionally, in small-group learning, tutors are expected to be experts in the process of small-group facilitation but not necessarily in the content of the problem to which a solution is sought. A successful group is one that can purposefully proceed without constant intervention by the tutor. In managing a small group, a tutor has to consider the task and the maintenance of the group. The task must be clearly defined and each participant's role must be understood by all members in the small group. The maintenance of the group involves establishing a "climate" for discussion that is open, trustful, and supportive. Small groups can take on different structures: one-to-one discussion, "buzz" groups, brainstorming, role playing, plenary session, and evaluation discussion.[1] Recently, the structure of small groups has been extended to include problem-based learning (PBL).

Barrows and Tamblyn,[2] in their elaborations on PBL, state that a tutor must understand the process of clinical reasoning and must be skilled in facilitating small-group learning. Throughout the PBL process the tutor helps the students identify their learning needs and assists them in setting the priorities of the program objectives and personal learning issues. Barrows[3] also states that the

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Another article about small-group learning and tutors' content expertise appears on page 470.

A commentary about the value of tutor content expertise in problem-based learning appears on page 454.

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ACADEMIC MEDICINE

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

AUGUST 1992
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ACADEMIC MEDICINE

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; ($40.00/1 year for students); $130/2 years; $185/3 years; and $7.00 per single copy.

Subscriptions received before June 30 will be honored for the calendar year: (January through December). Issues from January up to receipt of first issue of new subscription will be mailed automatically.

Subscription requests received after June 30th will be honored for the fiscal year (July through June). Subscribers who want back issues for January through June of that calendar year must purchase them as individual back issues at $7.00 each and as available in stock.

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Advertising: Diane Sherel, Advertising Manager, Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, PA 19107; (215) 546-0313.
Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
Cancellations of an *Academic Medicine* subscription must be submitted in writing to Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037. Claims for back issues will be honored for only the three months before the cancellation.
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An Objective Structured Clinical Examination for the Licentiate: Report of the Pilot Project of the Medical Council of Canada

Abstract—The Medical Council of Canada (MCC) administers a qualifying examination for the issuance of a license to practice medicine. To date, this examination does not test the clinical skills of history taking, physical examination, and communication. The MCC is implementing an objective structured clinical examination (OSCE) to test these skills in October 1992. A pilot examination was developed to test the feasibility, reliability, and validity of running a multisite, two-form, four-hour, 20-station OSCE for national licensure. In February 1991, 240 volunteer first- and second-year residents were tested at four sites. The candidates were randomly assigned to one of two forms of the test and one of two sites for two of the four sites. Generalizability analysis revealed that the variance due to form was 0.0 and that due to site was .16 compared with a total variance of 280.86. The reliabilities (inter-station) were .56 and .60 for the two forms. Station total-test score correlations, used to measure station validity, were significant for 38 of the 40 stations used (range .14–.60). The results of the OSCE correlated moderately with the MCC qualifying examination; these correlations were .32 and .35 for the two test forms. Content validity was assessed by postexamination questionnaires given to the physician examiners using a scale of 0 (low) to 10 (high). The physicians' mean ratings were: importance of the stations, 8.1 (SD, 1.8); success of the examination in testing core skills, 8.1 (SD, 1.6); and degree of challenge, 7.8 (SD, 2.1). The results indicate that a full-scale national administration of an OSCE for licensure is feasible using the model developed. Aspects of validity have been established and strategies to augment reliability have been developed. *Acad. Med.* 67(1992):487–494.

Sir William Osler said, "To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all."[1] A corollary to this is that we need to observe students interacting with patients to assess their clinical skills. A fundamental truth is that the closer an examination simulates the eventual task, the more valuable the assessment will be. The heavy reliance in medical education over the last three decades on multiple-choice examinations has resulted in assessment methods that are highly reliable but lack face validity. That is, they do not closely simulate tasks that prospective physicians are expected to perform.

In the last 15 years, two interdependent techniques, patient simulation and the objective structured clinical examination (OSCE), have emerged. The inherent value of standardized patients (SPs) is the possibility of repeatedly and reliably simulating a patient's problem. The strength of the OSCE is the flexibility of its format and the structure it brings to clinical skills assessment. It is the state-of-the-art technique for assessing clinical competence.[2]

Many educators feel the time is right to incorporate performance-based testing into the licensing process. Currently, four major North American testing bodies, The National Board of Medical Examiners, The Educational Commission on Foreign Medical Graduates, The Medical Council of Canada, and La Corporation Professionnelle des médecins du Québec, either are developing or have implemented programs aimed at incorporating clinical skills assessment into their examinations.

Background

Over the last five years, the Medical Council of Canada (MCC) has been reviewing its examination objectives. It became evident that many of the competencies expected of licentiate candidates were not being evaluated by paper-and-pencil–based tests. This is particularly true of clinical skills such as history taking, physical examination, and communication. To date, the Qualifying Examination of the Medical Council of Canada (MCCQE) consists of four papers, labeled Q1–Q4. The first three are multiple-choice–based tests covering

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For more information about the authors, please turn to the end of this report on page 493.

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a broad spectrum of medical knowledge along traditional disciplinary lines. The fourth part consists of a newly developed format aimed at assessing clinical reasoning skills. In keeping with its mandate to establish and promote a qualification in medicine, the MCC initiated a process in 1989 to add to its examination a fifth component that would assess clinical skills.

The new component would be administered a minimum of 12 months after candidates' graduation. A national committee of physicians and educators was appointed by the MCC to review available testing methods. They selected the OSCE format because it was considered uniquely capable of assessing clinical skills, and because it complemented the other components of the MCCQE that assess knowledge-base and clinical reasoning skills. Its inclusion in the MCCQE would permit a more comprehensive evaluation of physicians' competence.

The OSCE was first described by Harden and colleagues in 1975.[3] This method consists of a series of stations in which a candidate performs discrete clinical tasks while being observed and marked from structured checklists. The tasks center around the interaction of a candidate with an SP. The SP is usually a lay individual trained to portray a patient's problem consistently and repeatedly. Much work has been done to refine the technique of SP portrayals,[4,5] and their fidelity has been established.[6-8] The OSCE has emerged as an excellent method of assessing clinical skills. Although labor-intensive and costly, it has been used at the initial phases of teaching history taking and physical examination,[9] at the end of medical school,[10,11] and during residency.[4,12] The OSCE has been used mostly at individual institutions for the assessment of clinical skills. There have been a few attempts to implement OSCEs across several institutions,[13,14] but they have not been used on a national scale for licensure.

The main challenge facing the planners of this project was to design a feasible, reliable, and valid OSCE for the estimated 2,200 candidates per year at a reasonable cost per candidate. The paper describes the results of the pilot project that was undertaken to evaluate the model proposed for national administration.

Method

The committee reviewed OSCE formats currently being used and from these developed a model. The pilot project was designed to test the feasibility of the model and to address several fundamental research questions.

Development of the Model

The committee designed an OSCE that was four hours long and comprised of two types of stations. There were ten 10-minute patient encounter stations and ten couplet stations. A couplet is a five-minute focused patient encounter followed by a five-minute post-encounter probe consisting of questions about the patient just seen. All stations were based on candidate–SP encounters. Twenty short stations were believed to be ideal,[15] as reliability is a function of both test length and the number of stations in a set time frame.[16] The goal was to have an examination that would reliably test a large number of candidates in the shortest possible time.

The committee realized that the task of assessing 2,200 potential candidates would present logistical problems, including geopolitical issues, examination security, and financial limitations. The examination would be administered at many test centers across Canada, with central coordination. The examination had to be offered in English and French. Equivalent forms of the test were necessary for use on the two test days. Each center would give the examination in two sites, and each site would accommodate 40 candidates per administration. Since the examination would be repeated in the morning and afternoon at both sites, there would be a total of eight administrations with a maximum capacity per center of 320 candidates.

Research Questions

The pilot was designed to answer three main questions: Can the examination be delivered at several sites with no systematic advantage or disadvantage to candidates, no matter which site they used? Can the examination be delivered in two forms with no systematic advantage or disadvantage to candidates, no matter which form of the OSCE they took? Can a four-hour, 20-station OSCE achieve an acceptable level of reliability?

Several additional questions were addressed. Can a criterion-referenced approach be used to set the passing score? Can SPs be used as examiners in some stations? Is there a systematic difference in the way candidates are scored, given that three examiners and three SPs would rotate through each station? What is the relationship between candidates' prior performances on the MCCQE and their performances on the OSCE? Would the station-development process result in examination questions that were realistic, challenging, and important?

Experimental Design

Four examination sites were chosen, two in Toronto and two in Montréal. The two Toronto sites were run independently to simulate sites in different cities. Candidates from Toronto, stratified by school of graduation, were assigned randomly to one of the two sites to test the hypothesis that the examination could be delivered at more than one site with equivalence. To test the equivalence of the two examination forms, the Toronto candidates were randomly assigned to sit the morning or the afternoon administration at which the different forms were used.

The two Montréal sites were administered by one office to evaluate the logistics of testing 160 candidates, on one day, with one form at two locations. This was done to test the proposed 1992 model for site capacity. The Montréal center also focused on whether there was a systematic difference in candidates' scores when

SPs rated compared with when physicians rated. One physician and two SPs rated candidates at each of six stations. One SP rated by observation (as an additional examiner) and the other SP rated by recall after portraying the patient.

Questionnaires to assess the content validity of the stations were distributed to the physician examiners, asking them to rate the stations they had observed according to the importance of each station, its capacity to test core skills, and the degree to which they believed it challenged most candidates.

For two reasons, the committee decided to test 320 candidates for the pilot. First, a power calculation, based on an alpha error of 0.05 and a beta error of 0.1, revealed that a sample size of 100 candidates per center was necessary to detect differences as small as 5%. Second, 160 candidates per center per day was necessary to test the feasibility of the 1992 model. The candidates were paid volunteer first- and second-year residents recruited from the three participating institutions: the University of Toronto, McGill University, and Université de Montréal.

Test Development

The blueprint for the pilot was based on the Medical Council's examination objectives. The objectives had been used to generate a matrix of symptoms and causes that was accessed randomly to generate examination problems for the pilot. The random sample was stratified by age group, in proportions derived from billing data from two provinces. Once an assessment objective was deemed practical for an OSCE format, the committee constructed a rudimentary scenario prescribing the station configuration and the domain of competence to be tested. For example, if the symptom–cause generated was abdominal pain due to appendicitis, the committee might prescribe the following: a young man comes to the emergency room complaining of abdominal pain. It is a couplet station focusing on physical examination and management strategies for such a patient. It was theorized that the best means of achieving equivalence of the two forms of the examination lay in having the author create two stations of similar degrees of difficulty, testing the same domain of competence in the same specialty. For example, an author writing a station on appendicitis would also create a similar station on abdominal pain caused by acute cholecystitis.

Stations (i.e., cases) were written by representatives and their colleagues from the 16 Canadian medical schools. The representatives attended a station-writing workshop facilitated by committee members. In addition to writing stations, all the authors rated each checklist item according to its difficulty and relevance so that the Ebel method[17] of criterion-referencing could be used by the committee to set the passing score. Each station received a three-level review. The first review was by project staff to ensure the feasibility of the station. The second level of review was by two content experts. The third level of review was by a panel consisting of an "OSCE expert," a content expert, a family physician, and another physician. All recommended changes were effected centrally. The stations were then translated into either English or French. To verify the fidelity of the translation process, stations were converted back to the original language by independent translators.

The final examination consisted of stations that tested across all major disciplines, in the competencies of history taking, physical examination, communication, and management. Two to four SPs were trained for each station at each site. There were seven patient trainers engaged in producing the pilot, working in teams of two or three per site. The SPs each received an average of five hours of training. Those SPs who had the additional responsibility of scoring received extra training. Three senior trainers met centrally to review each station and ensure a common understanding of the roles. On the examination day, the physician examiners received a one-hour orientation that was standardized across sites. During this hour, they reviewed their station checklists, conferred with other examiners, and met with the SPs working at the station.

Data Collection and Analysis

Candidates' scores were derived from two sources. First, their performances during the interactions with the SPs were assessed using structured content checklists, global rating scales, and an interpersonal communication scale. Second, post-encounter probes required short, written, free-response answers. These were scored on the day of the examination by physicians, who were provided elaborate rating scales for correct answers, partially correct answers, and incorrect answers. Standardization of responses that were difficult to mark was accomplished by telephone communication across sites.

Answer sheets were optically scanned and statistical analysis was performed.[18,19] Generalizability theory was used to derive reliability and to analyze site and form effects. (Generalizability analysis was performed to deduce norm-referenced coefficients.) Examiner and patient effects were assessed using within-station one-way analysis of variance (ANOVA). The candidates were assigned in random order to rotate through the stations. Therefore, observed examiner and patient effects were attributed to true differences in examiners or patients rather than to differences in the candidates. Repeated-measures ANOVA was used to compare the SPs' scorings with the physicians' scorings. Pearson correlation coefficients were computed to compare each candidate's prior scores on Q1–Q4 with the OSCE scores. Station-total test score correlations were calculated as a measure of station validity.

There were approximately 1.25% of data points missing because some examination items were not completely recorded. Missing data points were replaced by a zero, which was the score assigned to a checklist item in those instances where the candidate

Table 1

Numbers of Personnel and Candidates Participating in the Medical Council of Canada's Pilot OSCE, by Site, 1991

Site*	Standardized Patients	Examiners	Post-encounter Probe Markers	Support Staff	Candidates
Site 1	74	30	4	5	63
Site 2	73	31	4	9	62
Site 3	72	39	3	12	54
Site 4	70	29	5	12	61
Total	289	129	16	38	240

*Site 1 was the Hospital for Sick Children; Site 2 was the Sunnybrook Health Science Centre; Site 3 was the Hôpital St. Luc; and Site 4 was the Royal Victoria Hospital.

had not performed the specific task. Thus, when a datum was missing from a checklist item, it was interpreted to mean that the candidate had not performed the task.

Results

On February 2, 1991, the OSCE was administered at two locations in Toronto: the Hospital for Sick Children and Sunnybrook Health Science Centre; and in Montréal at the Hôpital St. Luc (in French), and at the Royal Victoria Hospital (in English). Table 1 indicates the number of candidates tested and the personnel at each of the four sites. Despite an oversubscription of 15%, designed to compensate for candidates' not being available, there was a shortfall at each site, resulting in a study population of 240 candidates.

Table 2 presents the means and standard deviations of the test scores at each examination location. Table 3 depicts the results of the generalizability analysis for the Toronto candidates, who were randomly allocated to a site and a form. The variance due to site was .16, compared with a total variance of 280.86, indicating that there was virtually no difference attributable to site assignment between the candidates' scores. There was no variance due to form, indicating that candidates were not systematically advantaged or disadvantaged by which of the two examination forms they took.

Table 4 provides the reliability statistics for the various components of the examination. The overall reliability of Form A was .56 and that of Form B was .60.

The cutting scores derived from the Ebel method were 60% for Form A and 59% for Form B. These cutting scores were developed before the examination and without the benefit of actual performance data. The mean scores were 60.46 and 63.06 for Form A and Form B, respectively, indicating that if the cutting scores had been applied, over 40% of candidates would have failed. Before Ebel or any other method is used for criterion-referencing a performance-based examination such as the MCCQE Part II, further work will be required.

There were significant SP effects in 13% of the stations and significant examiner effects in 40% of the stations (alpha = 0.05).

In six stations at the Royal Victoria Hospital site, both the SPs and the physicians rated candidates in an attempt to test the validity of using SPs to score. Three separate scores were obtained for each candidate at these stations, with as many as six forms apiece being completed. This resulted in missing data so that only four stations could be assessed. At two of the four stations, the mean scores given by the physicians were equal to those given by the SP observers; at the other two stations the physicians scored the candidates' performances significantly lower than did the SPs. In three of four stations, the mean scores given by the SP observers were not different from the mean scores given by SPs rating from recall. At one of the four stations, the SPs who rated from recall scored the candidates' performances significantly higher than did the SPs who rated from observation. These six stations were videotaped and these differences can be evaluated in the future.

Several concerns regarding examination validity were addressed. Individual item validation was ascertained using item-total test score correlations. The correlations for the 40 stations of the two forms of the examination ranged from .14 to .51. Twenty-eight of the 40 stations had correlations in the moderate range (above .30). Content validity was in part assessed by questionnaires completed by the physician examiners. Three questions were asked concerning station content, each rated on a scale of 0 (low) to 10 (high). The stations were deemed to be "important," with a mean of 8.1 (SD, 1.8). The sta-

Table 2

Mean Scores of Candidates Who Took the Medical Council of Canada's Pilot OSCE, across Sites and Forms, 1991

Site and Form	Mean Score	(SD)
Hospital for Sick Children		
Form A (English)	61.08	(4.58)
Form B (English)	64.12	(4.10)
Sunnybrook Health Science Centre		
Form A (English)	61.07	(2.85)
Form B (English)	62.00	(4.72)
Hôpital St. Luc		
Form A (French)	60.64	(4.77)
Royal Victoria Hospital		
Form A (English)	59.04	(6.69)

tions were thought to have tested core skills, with a mean of 8.1 (SD, 1.6). The stations were believed to have challenged the candidates, with a mean of 7.8 (SD, 2.1).

The candidates' scores were compared with their performances on the MCCQE that they had taken at the end of medical school. The correlations between the total score on the MCCQE and the OSCE score were .23 for Form A and .26 for Form B; .32 and .35, respectively, when corrected for attenuation, that is, taking into account the reliability of the examinations.

Table 3

Generalizability Analysis of the Effects of Form and Site for 120 Randomly Chosen Candidates at the Toronto Testing Sites, 1991*

Effect	Degrees of Freedom	Variance
Form	1	0.0
Site	1	.16
Candidate: (form × site)	116	8.71
Station: form	38	78.53
Form × site	1	0.0
Site × station: form	38	26.73
(Station: form) × (candidate: form × site)	2,204	166.73
Total variance		280.86

*The variance due to site was .16, compared with a total variance of 280.86, indicating that there was virtually no difference attributable to site assignment between the candidates' scores.

Discussion

The OSCE has emerged as the state-of-the-art method of testing clinical skills. It has the major advantage of observation of actual performance. The use of SPs has enabled this examination to simulate real-world conditions with a high degree of fidelity.

The OSCE has limitations. It is a labor-intensive effort that is costly to run. To implement an OSCE requires a dedicated and knowledgeable team. In general, a lengthy examination of six hours or more is required to achieve high levels of reliability.[2]

In the pilot program, the logistics of staging a multisite OSCE were challenging. The examination was centrally coordinated with peripheral administration. This was an effective administrative model for station development, SP trainer training, and standardization of examination delivery. Decisions were made centrally on an ongoing basis, including resolving last-minute difficulties. However, the scope of the project, the several research agendas, and the restricted time line seemed to dictate a need to distribute several production tasks to different locations. This resulted in inefficiencies and overlapping activities.

Two very important lessons were learned. First, production of this type of examination cannot be rushed. Adequate time is needed for case development, standard setting, translation, and the technical formatting necessary for computer scoring. Our estimate is that production must be started 14–16 months prior to administration. Second, an examination of this scale requires that all aspects of development, production, and site supervision be centralized. The pilot suffered because production tasks, site activities, and data analysis were distributed to too many locations for the central committee to provide adequate support and direction.

The costs incurred during the pilot are not a clear indication of the costs of actually running the examination. Excluding the one-time research and development costs, the current projection of the cost per candidate is $800–$1,200 Canadian ($680–$1,020 U.S.) The exact figure is dependent on the total number of candidates tested, the number of sites used, and the degree of medical school support received.

This cost is higher than others have suggested[20] but is inclusive. The projected cost covers fees paid to station authors and examiners, administrative meeting costs, staff salaries, and related expenses. Such expenses are rarely included in estimating cost per candidate because often faculty have volunteered time, and administrative expenses are absorbed through institutional budgets. It is very important to note that the MCC model could not

Table 4

Reliability Data for Form A and Form B, Overall and for Components, as Used in the Medical Council of Canada's Pilot OSCE, 1991

		α*	
No. of Units	Components	Form A, Sites 1–4	Form B, Sites 1 and 2
10	10-minute stations	.39	.34
10	Couplet stations	.45	.59
14	History	.45	.50
6	Physical exam.	.43	.39
10	Management strategies	.31	.58
12	Physician examiner	.45	.44
8	Standardized patient examiner	.38	.51
20	Overall	.56	.60

*Reliability, symbolized here by alpha, is the generalizability coefficient calculated as the variance due to candidates divided by the sum of the variances due to candidates, examiners, and candidate–examiner interaction.

have worked at all without the cooperation of the three medical schools involved, as they contributed space and other necessary resources. The MCC is building a partnership with medical schools so that the examination can be delivered at university-supported sites.

It would seem clear that examination materials must be secure for a high-stakes test. However, an OSCE necessitates that case materials be distributed among SPs and SP trainers; thus, the materials are widely circulated well before the examination date. For the pilot, the concern was in part mitigated by the fact that few individuals had more than one of 20 examination questions. In addition, the SPs were selected with consideration for their understanding of the confidential nature of the materials and were required to sign a document agreeing to respect security policies. While security remains a concern, there is recent evidence to suggest that prior knowledge of the topics covered in the test may not affect results. Colliver and colleagues administered the same examination to their students over a three-week period and found that the students who took the test in the early period did no differently from the students who took it at the end.[21]

The results of this pilot showed no difference in students' scores as a function of examination site. This finding is significant for a national-scale examination and is congruent with two earlier multisite studies,[13,14] although these studies could not randomly allocate students to sites. The equivalence between the present study's sites may be attributed to several factors. Central administration ensured strong similarities in the setups of the sites and in standardizing the content and order of the examination. The senior trainers were experienced in selecting and training SPs, which may be a significant factor in producing reliable SP portrayals.[22] While some investigators have cautioned that differences in SP portrayal may become a problem in a multisite OSCE,[23] the present study showed uniformity in SP portrayal in 87% of the stations. Of the 13% of stations where an SP effect was noted, the majority were ones in which SPs functioned as both patient and examiner. In the future, only physician examiners will be used. Strategies for continued equivalence of sites will include an upgraded and strong central administration, improved resources for SP trainers, and videotapes for examination-day orientation of participants.

The proposed model for national administration requires two separate days of testing to accommodate all the candidates. In order to administer a secure examination two distinct forms are required. Our results indicate that the attempt to create parallel and equal test forms was successful. This supports the practice of having matching cases written by the same author and the careful matching of the forms. Almost all cases were matched for gender, age, domain of medical knowledge, and clinical skill tested.

In the Canadian context, equivalence of examination delivery in French and English is essential. We originally attempted to choose bilingual students at random to take the examination in either of the two languages, but were thwarted by the insufficiency of the number of individuals who considered themselves functionally bilingual. However, the mean score of the English-speaking candidates who took form A of the OSCE was 61.04, and the mean score of the French-speaking candidates who took the same form was 60.64. These nearly identical mean scores provide inferential evidence that language was not a factor in the examination.

Reliability is a fundamental consideration of any assessment process. While there is no strict value that constitutes a reliable examination, there is an emerging consensus that reliability of .80 or greater is desirable for a high-stakes examination. The reliabilities of the pilot examination were .56 and .60 for the two test forms. This falls short of the desired figure but is consistent with most other four-hour OSCEs.[2] Factors known to influence the reliability of this type of examination include total testing time, number of stations, integrity of data collection and processing, consistency of the SPs' portrayals, heterogeneity of candidates' competencies, and consistency of examiners' scorings.

More than one examiner was used at each station, since examiners were asked to work a full day and it was anticipated that too heavy a load would fatigue them, which would affect their performance. The analysis revealed significant interexaminer inconsistencies in 16 of 40 stations. Examiners polled after the test uniformly stated that they would have favored working a half day with no breaks. This would eliminate the need for more than one examiner per station, a strategy that will be adopted for the 1992 administration. Examiners will also receive a more comprehensive orientation to their tasks in order to minimize examiner effects across sites.

Two other aspects of the pilot might have had negative impacts on reliability. Reliability was artificially deflated because the candidates were given zero when data were missing. For future administrations, only one form per station will be used, to minimize missing data. Second, the candidates were paid volunteers and likely to have been a more homogeneous group than the candidates who will take the eventual examination; this may have had an effect, because the more homogeneous the group, the harder it is to achieve high levels of reliability.

Table 4 shows that the reliability of the couplet stations was higher in both forms of the examination than was the reliability of the 10-minute stations. A model that might augment reliability is one in which only the couplet-station format was used. This would eliminate, however, the possibility of assessing competencies such as communication skills and management skills, since these require the longer 10-minute patient-encounter format.

The major consequence of suboptimal reliability is an increased incidence of false positives; that is, an increased possibility that some candidates who were not competent might pass the examination by chance if given enough opportunities to repeat. One way to avoid this is to strictly limit the number of times the examination can be taken. Other options being considered to augment reliability include combining the Q5 score with other elements of the MCCQE for purposes of making a pass-fail decision; and lengthening the examination.[2,16,17]

The concerns about reliability for a high-stakes examination cannot be taken lightly. Although it is anticipated that changes being made in the delivery of the examination will result in a higher reliability than was achieved in the pilot, this is not a certainty. It may be that reliability levels in the range of .60 are an inherent feature of a four-hour OSCE given to a relatively homogeneous population. Despite this concern, it would seem reasonable to include the OSCE in a program of national licensure as part of a comprehensive examination system that assesses different competencies with different examination methods. The OSCE is one of the few examination methods that can assess data-gathering skills and patient-physician communication skills, and is the only method that can achieve this with a high degree of fidelity to the clinical reality.

Validity has many aspects. The OSCE was chosen partly for its high face validity. Examiners confirmed content validity by judging the stations to be important, challenging, and suitable for the testing of core knowledge. Construct validity and criterion-referenced validity were not addressed.

A major unanswered question in performance-based testing is how to set the passing standard. For the last several decades, cutting scores have been norm referenced. This technique sets the passing score with reference to a defined group, resulting in a fixed number of individuals' passing the examination regardless of the difficulty of that particular administration. Within the MCC, there has been growing support for moving away from norm referencing, as it is argued that the passing score set is arbitrary.

The MCC, along with other licensing and certification bodies, is attempting to use criterion referencing. This involves linking success or failure to a fixed standard, usually defined by a panel of experts who attempt to numerically define the minimally acceptable performance. The difficulty in applying criterion referencing to this type of examination centers around two problems. First, there are no prior performance data on which to anchor judgments. Second, judges have intrinsic difficulty, especially in the field of medicine, with the notion of the minimally competent student or practitioner. This difficulty may cause the judges to set unrealistic passing standards, as occurred with the pilot reported here. Criterion referencing makes intuitive sense, however, and offers an approach that is fundamentally more sound than norm referencing. However, its application to performance-based testing is not yet sophisticated enough to be employed with confidence.

Because of difficulties encountered using the Ebel method for setting a passing standard, the MCC is investigating the use of alternative methods of criterion referencing for future administrations of the OSCE. Safeguards are being built in to the decision-making process to ensure that the passing standard set is within acceptable limits.

Clinical skills, such as taking a history, performing a physical examination, communicating with patients and their families, and interpreting data in the context of clinical reality, are central to teaching the art and science of medicine. Licensing authorities have focused on assessing a candidate's cognitive skills, an important but by no means exclusive part of being a good doctor. The results of the pilot affirmed that the model developed for the addition of a clinical-skills-assessment component to the qualifying examination is feasible. The strategies developed for subsequent administrations have the potential for augmenting reliability. There are no plans, however, to run further pilot testing before national administration of the OSCE. The MCC has adopted a resolution establishing the OSCE as the fifth component of a comprehensive examination for the MCCQE, with the first administration in October 1992.

The low-to-moderate correlation between the candidates' scores on this examination and their scores on the multiple-choice component of the MCCQE was provocative. One interpretation is that this new examination is testing other important skills that cannot be inferred from the results on multiple-choice tests. This would support our hypothesis that the OSCE is essential to the licensing process, because it is anchored to the fundamental skills we teach our students.

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The authors gratefully acknowledge the editorial assistance of Deborah Birkett.

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Women Physicians in Dual-physician Relationships Compared with Those in Other Dual-career Relationships

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Abstract—This study compared the career and domestic responsibilities of women physicians whose domestic partners were physicians (WP-Ps) with those of women physicians whose domestic partners were not physicians (WP-NPs). In 1988 the authors surveyed 602 women physicians in a large midwestern city regarding their career and domestic roles; 390 were physicians in training (students and residents), and 212 were physicians in practice (academic medicine and private practice). Overall, 382 (63%) responded; of the 382, 247 (65%) had domestic partners; of these 247, 91 (37%) were WP-Ps and 156 (63%) were WP-NPs. The WP-Ps were found to be twice as likely as the WP-NPs to interrupt their careers to accommodate their partners' careers. The WP-Ps also assumed significantly more domestic responsibilities and worked fewer hours practicing medicine than did the WP-NPs. The 163 women physicians in training (44—48%—of the WP-Ps and 119—76%—of the WP-NPs) demonstrated a more egalitarian division of labor overall, with no significant differences between the WP-Ps and the WP-NPs. The authors recommend that longitudinal studies be undertaken to determine whether women physicians in training continue this trend as they enter the practice of medicine. *Acad. Med.* 67(1992):542–544.

The recent expansion of the nation's supply of physicians has brought with it dramatic increases in the number of women entering medical school and practice. By the year 2000, one physician in five will be a woman.[1] A number of studies have examined how women's entry into medicine will affect the delivery of medical care, with particular emphasis on the effects of career interruptions due to childbearing and child-rearing.[2-5] In one study, between 58% and 78% of women physicians were found to have experienced a conflict between marriage or parenthood and career.[4] In two studies, 40–50% of women physicians reported changes in their career plans because of marriage or family responsibilities.[2,3] Another study showed that for women physicians, marriage and child-rearing were strongly associated with reductions in hours worked and with lower earnings.[6]

Approximately 85% of women physicians marry professionals, 50% of whom are also physicians. A limited number of studies have examined dual-physician partnerships.[6-7] According to the 1981 census data, in 73% of these marriages the male physician earns more, and in 63% of the cases, the male physician works more hours. Lorber reexamined these findings and reported an age effect: in couples where both partners were over 40 years old, women physicians tended to follow the lead of men physicians, whereas in couples where both partners were under 40 years old, decisions were more mutual.[7]

The studies just described have outlined the impacts of dual-career relationships on women physicians' career plans and domestic responsibilities. However, there is no evidence that dual-physician relationships have a differential impact on women physicians' careers and domestic responsibilities when compared with other dual-career relationships. The purpose of this study was to compare the career and domestic responsibilities of women physicians whose partners are physicians (WP-Ps) with those of women physicians whose partners are not physicians (WP-NPs).

Method

In 1988 a 28-item questionnaire was developed to elicit information from women physicians in training (medical students and residents) and women physicians in practice (private practice and academic medicine) regarding their career and domestic responsibilities. The questions addressed relationship status and issues, responsibilities for child-rearing and household tasks, and the relative priorities of career, relationship, and child-rearing.

Overall, 602 questionnaires were mailed: 390 to physicians in training affiliated with a large private school in the upper Midwest, and 212 to practicing physicians residing in an upper midwestern metropolitan area (population in excess of 1.2 million). The questionnaire data were keypunched, and measures of frequency, central tendency, and t-tests for significance were obtained.

Results

The overall response rate was 63% (382 of the 602 women physicians). Responses by group were as follows: women physicians in training, 57% (222 of 390), and women physicians in practice, 76% (160 of 212). The mean age of the responding physicians was 31 years, with a range of

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21–68 years. Of the 382 physicians, 247 (65%) were in marital or other committed relationships; of these 247, 91 (37%) had partners who were physicians, and 156 (63%) had partners who were not physicians. Of the 247 physicians who had partners, 163 were physicians in training, and 84 were physicians in practice. Of the 163 physicians in training who had partners, 44 (27%) had partners who were physicians; of the 84 physicians in practice who had partners, 47 (56%) had partners who were physicians. Thus, the physicians in practice were twice as likely as were the physicians in training to have partners who were physicians.

The results indicate that the 91 women physicians whose partners were physicians (WP-Ps) were more than twice as likely to interrupt their own careers for their partners' careers compared with the 156 women physicians whose partners were not physicians (WP-NPs): 25% versus 11%. In contrast, the men partners who were not physicians were significantly more likely to interrupt their careers than were the men partners who were physicians (41% versus 15%, $p < .05$).

Table 1

Percentages of 247 Women Physicians Assuming Primary Responsibility for Domestic and Child-rearing Tasks, Comparing Those Whose Domestic Partners Were Physicians with Those Whose Partners Were Not Physicians, 1988*

Domestic or Child-rearing Task	% Assuming Primary Responsibility: Partnered with Physician ($n = 91$)	% Assuming Primary Responsibility: Partnered with Non-physician ($n = 156$)	Difference in % Points
Make child care arrangements	81	66	15†
Transport the children to doctor	76	60	16†
Shop	73	57	16‡
Cook	70	62	8†
Laundry	67	58	9†
Housework	66	58	8†
Transport children to lessons	66	40	26†
Take children to sitter	65	55	10
Go to parent–teacher conferences	64	46	18
Bathe the children	63	56	7
Feed the children	62	55	7
Put the children to bed	61	55	6

*In 1988 the authors compared the career and domestic responsibilities of women physicians whose domestic partners were physicians with those of women physicians whose partners were not physicians. Of the 602 women physicians who were surveyed (consisting of medical students, residents, private practitioners, and academic physicians, all in a large midwestern metropolitan area), 382 (63%) responded; of these, 247 (65%) had domestic partners; of these 247, 91 (37%) had partners who were physicians.

†$p < .05$.

‡$p < .01$.

Twelve questionnaire items focused on domestic (e.g., housework) and child-rearing responsibilities (e.g., bathing children, feeding children). On seven of the 12 items, the WP-Ps had significantly more responsibility for childbearing and domestic tasks relative to the WP-NPs (see Table 1).

Seventy percent or more of the WP-Ps had primary responsibility for making child care arrangements, transporting children to the doctor, shopping, and cooking. In contrast, the highest percentage of the WP-NPs who assumed primary responsibility for any single task was 66%, with the lowest percentage being 40%. The range for the WP-Ps was 61–81%. When, among the WP-Ps, the responses of the physicians in training were compared with those of the practicing physicians, the division of labor for various child-rearing and other domestic responsibilities was more egalitarian for the WP-Ps who were physicians in training. Significant differences ($p < .05$) were obtained on nine of the 12 items, with the division of labor for the WP-Ps who were physicians in training closely matching the division of labor reported by the WP-NPs generally.

The increased responsibility in child-rearing and other domestic tasks for the WP-Ps who were in practice was offset by a decrease in hours worked when compared with the hours worked by the WP-NPs. The practicing WP-Ps worked in medicine an average of nine hours fewer per week than did the WP-NPs (43 versus 52). As a corollary, the physician partners of the WP-Ps worked an average of 15 hours more per week than did the non-physician partners of the WP-NPs (58 versus 43).

Discussion

When the women physicians are examined in aggregate, the major findings of this study are consistent with those of previous investigations. However, as just described, when the responses of the physicians are analyzed according to whether their partners were physicians or were not physicians, several important differences emerge.

Perhaps most interesting is the finding that although the WP-Ps generally experienced a significantly greater share in the division of labor for various child-rearing and other domestic responsibilities than did the WP-NPs, those WP-Ps who were physicians in training appeared to enjoy a more egalitarian division of labor — approaching that of the WP-NPs — than did the WP-Ps who were practicing physicians. Longitudinal studies should be undertaken to assess whether women physicians in training whose domestic partners are physicians will maintain a fairly egalitarian division of labor once they become practicing physicians.

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Use of Free Time in the Third and Fourth Years of a Flexible Curriculum

ROBERT J. McCOLLISTER, M.D.

Abstract—In 1988, the author surveyed senior students on their use of the six months of free time in the junior-senior biennium at the University of Minnesota Medical School-Minneapolis. The students were asked both to provide detailed reports on their free-time activities and to rank the three activities they considered to be most helpful to their professional development. Of 274 seniors, 191 (70%) responded. The students had used a majority of their free time for pursuits related to education and advancement of their careers. Approximately one-third of the time had been used for vacations. The activities the students viewed as most helpful included research, interviewing for residency positions, vacation, study elsewhere, and preparation for the National Board of Medical Examiners Part II examination. The author suggests that when free time is made available in a flexible curriculum, students use it to advantage in an educationally responsible manner. *Acad. Med.* 67(1992): 544-546.

Within the two full academic years of the junior-senior biennium at the University of Minnesota Medical School-Minneapolis, students are required to complete a total of 72 weeks in full-time assignments in clinical courses. The remaining 24 weeks in the two-year calendar are termed "free time." The inclusion in the M.D. curriculum at this school of what amounts to a half year of free time for students in the junior-senor biennium provides substantially more free-time than is provided in the junior and senior years at most U.S. medical schools. Free time may be used for any purpose, including vacation, and may be scheduled in any manner, from an entire six-month single block to three- or six-week blocks placed throughout the two years. Thus, flexible scheduling at Minnesota provides every opportunity for students in their third and fourth years to schedule their courses and free time to maximum advantage for academic career purposes or personal reasons.

A study of students' use of free time was undertaken to determine how students use the time, with special attention to whether a substantial amount of free time is used for educational purposes to help students progress toward career goals. If so, such flexibility might provide advantages that would recommend this arrangement to other medical schools.

Method

In April 1988, the 274 senior medical students at the University of Minnesota were surveyed by questionnaire and were asked to provide a detailed analysis of how each had used the 24 weeks of free time. To promote accurate recall, the students were given a copy of the two-year academic program that showed where their free time had been scheduled. Several possible categories of activities were suggested to prompt the students and ensure complete reporting of the use of free time. In addition, the students were asked to rank the three of these activities that they considered most helpful to their professional development, with a ranking of 1 indicating most helpful. For each senior student, data were obtained on residency type and location, age, sex, performances on the National Board of Medical Ex-

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SEPTEMBER 1992

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Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

SEPTEMBER 1992
VOLUME 67
NUMBER NINE

ACADEMIC MEDICINE

JOURNAL OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years; $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; ($40.00/1 year for students); $130/2 years; $185/3 years; and $7.00 per single copy.

Subscriptions received before June 30 will be honored for the calendar year (January through December). Issues from January up to receipt of first issue of new subscription will be mailed automatically.

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Advertising: Diane Sherel, Advertising Manager, Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, PA 19107; (215) 546-0313.
Subscriptions and changes of address: Membership and Publication Orders, AAMC, 2450 N Street, NW, Washington, DC 20037; (202) 828-0416.
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ORIGINAL CONTRIBUTIONS

ARTICLES

Comparing the Characteristics of Schools That Produce High Percentages and Low Percentages of Primary Care Physicians

MICHAEL E. WHITCOMB, M.D., THOMAS J. CULLEN, Ph.D.,
L. GARY HART, Ph.D., DENISE M. LISHNER, M.S.W., and
ROGER A. ROSENBLATT, M.D., M.P.H.

Abstract—To examine whether the medical school environment is important in influencing students to choose careers in primary care, the authors in 1991 compared certain characteristics of the environments of schools that produced high percentages of primary care physicians with those of schools that produced low percentages over a five-year period. The authors used the American Medical Association Physician Masterfile to identify the percentage of graduates of each of 121 medical schools for the period 1981–1985 who entered primary care specialties. They then compared the 25 schools that produced low percentages (22–29%) with the 25 schools that produced high percentages (39–56%). The results demonstrate important differences between the two groups of schools in their commitments to primary care education, their research programs, and their clinical environments supporting required clerkships. The authors conclude that a school's educational environment is an important factor in influencing some students to pursue careers in primary care medicine. *Acad. Med.* 67(1992):587–591.

There is general agreement among contemporary manpower analysts both in government and in the academic community that the supply of primary care physicians should be increased.[1,2] That consensus has its roots in the concerns that policymakers have about the quality of primary care provided by non-primary care specialists, the impact on health care costs of the growing numbers of non-primary care specialists and subspecialists, the adequacy of the supply of primary care specialists to staff health maintenance organizations (HMOs) and other managed-care models for delivering medical services, and the lack of access to basic medical care services in some rural and inner-city communities.

In the face of this apparent need, it is alarming that recent surveys of graduating medical students conducted by the Association of American Medical Colleges (AAMC) have demonstrated a steady decline in the level of medical students' interest in primary care medicine. Data from the National Resident Matching Program substantiate the results of the AAMC surveys. During the period 1986–1991, the number of U.S. medical school graduates who matched in residencies that might lead to a career in primary care (family medicine, internal medicine, and pediatrics) decreased by approximately 20%. To increase the supply of primary care physicians, those in the academic and policymaking communities will have to find ways to reverse these trends.

Medical students generally enter medical school with poorly defined career goals. Many have some idea about the kinds of specialties they would like to practice, although these initial impressions often change by the time students select residency training.[3] Although the specific forces that shape a student's specialty and career choice are not known, it seems intuitively correct that the nature of the educational environment that students confront during medical school must be important in influencing their choices.

To gain insight into whether characteristics of the educational environment influence students to choose careers in primary care medicine, we compared the educational environments of a group of medical schools that produced high percentages of primary care physicians with those of a group that produced low percentages of primary care physicians. We intend that our results should inform the thinking of those in the academic

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and policymaking communities who are seeking ways to increase the supply of primary care physicians.

Method

Our method is described in two general sections: one on study design and the other on data sources.

Study Design

In 1991 we identified the specialty choices of the graduates of 121 of the medical schools in the United States for the years 1981–1985. We excluded from our analysis graduates of the three schools in Puerto Rico and the Uniformed Services University of the Health Sciences. Students who initially enroll in the two-year program at the University of Minnesota–Duluth receive their degrees from other schools. Mercer University School of Medicine did not graduate students during the period 1981–1985. Graduates of the 121 schools who identified themselves as family physicians, general internists, or general pediatricians in the American Medical Association (AMA) Physician Masterfile were considered to be primary care physicians. We used a five-year study period to minimize the effect of year-to-year fluctuations on our analysis. The study period ended with the graduating class of 1985 so that we could be certain that the majority of graduates who were going to choose careers in primary care medicine had completed residency training.

We were able to determine the percentage of the graduates of each medical school who had chosen careers in primary care specialties. From this analysis, we identified a group of 25 schools that had produced high percentages (39–56%) of primary care physicians and a group of 25 schools that had produced low percentages (22–29%) of primary care physicians during the study period. We designated these two groups high-producer and low-producer groups, respectively.

To gain insight into the natures of the educational environments provided by the medical schools in the two groups, we identified the following sets of characteristics for each of the schools in the groups:

Type of Ownership, Location, and Class Size. The schools were classified as private or public, and the region of the country in which each school was located was noted. We arbitrarily divided the schools into those with class sizes equal to or greater than 100 students, and those with class sizes less than 100.

Research Intensity. The schools were classified according to their rankings among all medical schools in the levels of funding received from the National Institutes of Health (NIH) during the period 1977–1985. This period was used because it represented the years that the graduates of 1981–1985 were in school. The schools were classified as being research-intensive if they ranked in the top 30% of schools in NIH funding.

Commitment to Primary Care Education. The academic status of family medicine, the number of affiliated family medicine residency sites, and the sponsorship of an Area Health Education Center (AHEC) were used to assess a school's commitment to primary care education.

Clinical Teaching Site. The primary teaching hospital affiliated with each medical school was classified as a community hospital or academic medical center hospital according to criteria used by the Council of Teaching Hospitals (COTH) of the AAMC. The resident-to-bed ratio, the number of subspecialty fellows on site, the number of family medicine residents on site, the amount of the Medicare Direct Medical Education (DME) payment received, and the per-resident cost were noted for each academic medical center hospital.

We then compared the two groups to determine whether there were important relationships between a school's environmental characteristics and the percentage of its graduates who chose careers in primary care medicine.

Assuming that we would identify such relationships, we planned to examine whether the relationships would hold true for medical schools across the country, by means of the following method: first, to divide all 121 schools studied into quartiles based on the percentage of each school's 1981–1985 graduates who chose careers in primary care medicine and to compare the four groups of schools based on the relationships of their characteristics to percentages of primary care physicians; second, to use Pearson product-moment correlation analysis to test the statistical significances of the relationships for all 121 schools.

Data Sources

The AMA Physician Masterfile updated to December 1989 served as the physician database for this study. The database provides the medical school attended, year of graduation, self-designated specialty, and location for each active physician in the country. The database allowed us to identify the self-designated specialties of the 1981–1985 graduates for each medical school. We recognize that the AMA database does not distinguish between general internal medicine and some of the subspecialties of internal medicine. However, only 15% of the graduates identified themselves as general internists. Based on patterns of subspecialization in internal medicine, we are confident that this figure was not inflated to a significant degree by subspecialists.

The size, location, and ownership of each medical school were obtained from the annual *AAMC Directory of American Medical Education* for the years 1981–1985. Information on the amount of NIH funding that each medical school received during the years 1976–1985 was obtained from the NIH. Information on sponsorship of AHECs was obtained from the Health Resources and Services Administration, Public Health Service. The academic status of family medicine and the number of affiliated family medicine residency sites for each medical school were obtained from reports published by the American Academy of Family Physicians. Data on Medicare DME payments to teaching hospitals (for Fiscal Year 1986) were provided by the Health Care Financing Administration (HCFA). Specific information about the characteristics of academic medical center hospitals was not available for the 1981-1985 period. We were able to find 1988 data published by COTH. We consider that the conclusions we reached about the institutions from the 1988 data adequately reflect differences in the institutions that existed during the 1981-1985 period, since the characteristics of the institutions that we were interested in change very little on a yearly basis.

Results

In the aggregate, 34% of the medical students who graduated in the years 1981-1985 chose careers in primary care medicine. There was, however, wide variation among the medical schools in the percentages of graduates who chose primary care careers. For the majority of schools (71 of the 121 schools included in our study), the percentages of their graduates choosing primary care careers clustered in a narrow range (30-38%). Twenty-five schools produced fewer primary care physicians (range, 22-29%), and another 25 produced more primary care physicians (range, 39-56%). These two groups were designated the low-producer and high-producer groups, respectively. The marked disparity between these two groups in the production of primary care physicians was caused primarily, but not entirely, by differences in the production of family medicine physicians.

Table 1

Comparison of Characteristics of 50 Medical Schools That Produced High Percentages and Low Percentages of Primary Care Physicians, Classes of 1981-1985*

	No. Schools	
Characteristics	Produced High % ($n = 25$)	Produced Low % ($n = 25$)
Ownership		
Private	4	21
Public	21	4
Location		
Northeast	2	13
South	10	5
Midwest	7	4
Southwest	1	2
West	5	1
Class size		
>100	8	21
<100	17	4
NIH funding		
Top 10%	1	8
Second 10%	2	5
Third 10%	1	5
Primary care program		
Family medicine department	25	9
At least 3 GME sites in family medicine	14	3
AHEC sponsor	16	2
Teaching hospital		
Community hospital	10	0
Academic medical center hospital	15	25
>600 beds	1	20
Family medicine GME	14	8

*To examine whether the medical school environment is important in influencing students to choose careers in primary care, the authors in 1991 compared certain characteristics of the environments of the 25 U.S. schools that produced high percentages of primary care physicians (39-56%) with those of the 25 schools that produced low percentages (22-29%) during the years 1981-1985. The schools' characteristics included their rankings among all medical schools in the levels of funding received from the National Institutes of Health (NIH), their sponsorships of an Area Health Education Center (AHEC), and their degrees of involvement in graduate medical education (GME).

Table 1 provides a comparison of the characteristics of the medical schools in the two groups. Some of the striking differences between the groups are summarized in the following paragraphs.

Size, Location, and Ownership. The low-producer group consisted mainly of private schools with class sizes of more than 100 students located predominantly in the Northeast. In contrast, the high-producer group consisted mainly of public schools with class sizes of fewer than 100 students. The high-producer schools were more evenly distributed throughout the South, Midwest, and West.

Research Intensity. Eighteen of the low-producer schools, but only four of the high-producer schools, were research-intensive schools. Eight of the low-producer schools ranked in the top 10% (12 schools) of all schools in NIH funding. Only one of the high-producer schools ranked in the top 10%.

Commitment to Primary Care Education. All of the high-producer schools had granted departmental status to family medicine. The majority of these schools were affiliated with three or more family medicine residency teaching sites and had sponsored AHECs. In contrast, only nine of the low-producer schools had granted family medicine departmental status. Twelve of the low-producer schools had no affiliation with a family medicine residency teaching site, and only two had sponsored an AHEC.

Clinical Teaching Site. Ten of the

Table 2

Relationship between Production of Primary Care Physicians and Characteristics of Educational Environment for Quartiles of 121 Medical Schools, Classes of 1981–1985*

Quartile	No. Schools	Primary Care Physicians Graduated		% Having Family Medicine Departments	Average Annual NIH Funds in Millions of Dollars	Average Annual Medicare DME in Millions of Dollars
		Mean %	% Range			
1st 25%	30	43	38–56	94	7.4	1.6
2nd 25%	30	36	35–38	97	5.8	2.9
3rd 25%	30	33	30–35	90	10.7	2.9
4th 25%	31	27	22–30	47	20.3	6.8

*In 1991 the authors divided 121 U.S. medical schools into quartiles based on the percentage of each school's 1981–1985 graduates who chose careers in primary care; the authors then compared the four groups of schools based on the relationships of the characteristics of their educational environments to the percentages of primary care physicians they graduated. The schools' characteristics included their NIH (National Institutes of Health) funding and the Fiscal Year 1986 Medicare DME (direct medical education) payments to their affiliated academic medical center hospitals.

high-producer schools used community hospitals as their major sites for teaching clinical medicine. Fourteen of the 15 academic medical center hospitals that served as the primary teaching sites for the remaining high-producer schools had family medicine residents on site. Fourteen of these hospitals had fewer than 600 beds. In contrast, the major teaching site for each of the low-producer schools was an academic medical center hospital. Only eight of these hospitals had family medicine residents on site. Twenty of the hospitals had more than 600 beds.

The results of the analysis of whether the relationships between a school's production of primary care physicians and its environmental characteristics would hold true for all 121 schools are shown in Table 2. Of particular interest is the inverse relationship between the production of primary care physicians and receipt of federal support in the form of either NIH funding to the school or Medicare DME payments to the school's major affiliated hospital. The results are consistent with those we determined for the high-producer and low-producer schools. For all schools, the percentage of a school's graduates who chose careers in primary care medicine was negatively correlated with NIH funding to the school ($r = -.44$, $p < .01$) and with Medicare DME payments to the school's affiliated academic medical center hospital ($r = -.23$, $p < .05$).

Discussion

The results of our study provide several new observations about the supply of primary care physicians produced by the nation's medical schools. First, our results demonstrate for the first time the degree of variation that exists among the schools in the percentages of the schools' graduates who choose careers in a primary care specialty. Although the production of primary care physicians is about the same for the majority of schools, some schools are clearly low producers and some are high producers. The disparity between the latter two groups of schools in the production of primary care physicians is primarily, but not entirely, caused by differences in the production of family medicine physicians. Second, our results demonstrate differences in the characteristics of the educational environments of low-producer and high-producer schools that may well have an important influence on whether certain students select primary care or non–primary care specialties. Although the differences between the two groups of schools may be somewhat intuitively apparent, our study is the first to document these differences.

It is possible that the marked difference in the production of primary care physicians by the two groups of schools could be partially explained by the impacts that the schools' reputations might have had on students' decisions about which medical school to attend. For instance, some undergraduates might apply only to medical schools that have reputations that best fit the students' perceptions about their career plans. Similarly, students who hold multiple acceptances to medical schools may ultimately choose to enroll in schools that have educational environments that best fit the students' preconceived notions of their specialty interests. If that occurred frequently, it would affect a school's record of producing primary care or non–primary care specialists. This would, in turn, tend to exaggerate the importance of the educational environment in influencing medical students' career choices. We do not believe that many students actually make choices about which medical schools to attend in that manner. Thus, we believe that the natures of the schools' educational environments are primarily responsible for the marked disparity in the production of primary care physicians by the two groups of schools we analyzed.

It is evident from Table 1 that there were schools in both groups that did not entirely fit the group profiles. In that regard, a group of four schools within the high-producer group is of most interest. The four schools were research-intensive schools, had large class sizes, and provided the required student clerkships in academic medical center hospitals that tended to be larger than those affiliated with other

schools in the high-producer group. Three of the four schools are located in major urban centers. In a number of important ways, therefore, these four schools fit the profile of the low-producer group.

Each of those schools, however, also had a very strong commitment to primary care medicine. Each school had granted departmental status to family medicine, was affiliated with at least three family medicine residency sites, and had sponsored an AHEC. In fact, these four schools are recognized as having exemplary primary care educational programs.

The high productivity of the four schools underscores two important points. First, all of the schools in the high-producer group had strong commitments to primary care medicine. Second, there is no inherent conflict between a strong commitment to primary care medicine and a commitment to a strong research program. These points should not be overlooked by medical educators and policymakers as they consider how medical schools might increase the percentages of their graduates who choose careers in primary care medicine.

There is no doubt that most of the "messages" provided by society tend to encourage students to select careers in non-primary care specialties. This is particularly true with regard to the relative prestige and financial rewards attached to being a primary care or a non-primary care physician. Since all of the students confronted similar societal forces during the period we studied, we believe that the differences we observed between the high-producer and low-producer groups of schools were probably related to how the educational environments provided by the medical schools reinforced or neutralized the pressure to select a non-primary care specialty. Our observations suggest that a research-intensive, specialty-oriented environment will influence students to choose non-primary care careers and that the nature of a school's primary care educational program is probably very important in influencing some students to choose careers in primary care specialties.

The declining interest in primary care medicine careers by medical school graduates is alarming. To reverse this trend, government officials must attempt to deal with the societal forces that influence students' career choices. At the same time, medical educators must become more vigorous in addressing those factors under the control of the medical school that influence students to choose careers in non-primary care medicine. The results of our study suggest that the medical education community could begin by recommending that all medical schools introduce specific educational programs designed to influence students at least to consider careers in primary care medicine. Detailed analyses of the curricula of the high-producer schools identified in this study should provide information that will be useful in this effort.

Although we believe that all schools should participate in the effort to increase the supply of primary care physicians, we recognize that there are clear differences in the ways that medical schools perceive their roles and missions. That is as it should be. Many of the nation's medical schools have a long tradition of emphasizing research and the training of non-primary care specialists. It is not easy to make the educational environment of such a school more supportive of careers in primary care medicine. Indeed, it may be almost impossible for such a school, because of its tradition, location in a heavily populated metropolitan area, or lack of resources, to develop a primary care program that would have a real impact on its educational environment. There is no reason that all medical schools should have the same commitment to primary care medicine. Those interested in developing programs to increase the supply of primary care physicians, particularly foundation directors and government officials, should recognize the diversity of the nation's medical schools and target available resources to schools that have the greatest likelihood of being successful in this effort.

The study was supported in part by contract #HAR 0000017-03 of the Office for Rural Health Policy, Health Resources and Services Administration, Public Health Service.

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SHORT PAPERS

Health Education Programs in U.S. Medical Schools

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Abstract—To examine the status of teaching programs on health education in undergraduate medical education, the author in 1990-91 surveyed representatives of all 126 U.S. medical schools. Of the 97 institutions that responded, 63 (65%) offered instruction in patient education and 72 (74%) offered instruction in community health promotion. The responses indicated that a number of departments participated in instruction and that diverse methods of instruction and evaluation were used. Opinions of the representatives regarding the importance and adequacy of instruction in health education were quite favorable. The author concludes that more information is needed to determine the effectiveness of the instructional programs and their impact on the quality of medical care. *Acad. Med.* 67 (1992):596-598.

The health education skills of physicians are an integral element of quality medical care. Health education is defined as "the use of the education process to assist individuals to voluntarily adopt or alter behaviors that will improve or maintain their health."[1] Health education skills may be divided into two separate components: *patient education* (the teaching of individual patients) and *community health promotion* (the education of groups of people or of the community as a whole).

In 1980 the U.S. Surgeon General produced a set of 370 specific objectives for health promotion and disease prevention.[2] Analysis of these objectives revealed that 16% pertain to health education.[3] However, the majority of physicians in several surveys believed that they are unlikely to be very successful in affecting most health behaviors of their patients.[4,5] A 1979 study reported that 96% of all U.S. medical schools had a specific course for teaching interpersonal skills.[6] However, only 27% of those programs included instruction in patient education skills. Little, if any, evidence is available to suggest that significant changes have occurred in the past 12 years. Thus, before initiating reforms, proponents of health education training should determine the present status of instructional programs on health education in U.S. medical schools.

Method

The present, descriptive study was based on a survey using a questionnaire developed from a review of the pertinent literature. The content validity of the questionnaire was verified by a panel of recognized experts in medical education and patient education to minimize the possibility of measurement error. The questionnaire was mailed to the representative of each U.S. medical school identified in the *1990-91 AAMC Curriculum Directory* (of the Association of American Medical Colleges) as the contact person for that institution. Two mailings were conducted to maximize the response rate. The confidentiality of all the contact persons was maintained throughout the study.

The questionnaire distinguished the areas of patient education and community health promotion and addressed each area separately. The questions concerned the presence or absence of instruction in each area; the department(s) responsible for the instruction; the timing of the instruction; the instructional and evaluative methods employed; opinions on selected statements about the importance of health education instruction; perceived obstacles to the development of health education programs; and demographic data regarding the individual contact persons. The responses regarding opinions on the importance of health education instruction were given using a six-point, Likert-type scale, ranging from 1, strongly disagree, to 6, strongly agree.

Results

Responses were received from 97 of the 126 medical schools surveyed, for a response rate of 77%. Of these institutions, 63 (65%) reported that they offered instruction in patient education, and 72 (74%) reported that they offered instruction in community health promotion. Table 1 identifies the departments most commonly involved in those areas.

A majority of the programs were described as involving multiple instructional and evaluative methods. Typically, instruction included a combination of lectures during the preclinical years (the first two years of school) and practical activities or elective rotations during the clinical years (the third and fourth years of

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school). Evaluation involved written examination questions during the preclinical years and clinical encounters with actual patients (not simulated patients) during the later years.

An overwhelming majority of the contact persons agreed, ranging from slightly agree to strongly agree, that skills in patient education and in community health promotion "should be taught to all medical students" (98% and 96%, respectively). However, much lower percentages agreed that the areas are "given adequate curriculum time" (49% for patient education and 45% for community health promotion). About three-fourths of the contact persons agreed that "most students graduate with an appropriate level of skill" in each area.

Of the 95 contact persons who responded to the question regarding obstacles to health education programs, 80 (84%) identified one or more obstacles. Lack of curriculum time was the obstacle most frequently selected (68, 72%). Lack of interested faculty (36, 38%), lack of trained faculty (27, 28%), and lack of teaching materials (10, 11%) also were commonly identified. Other obstacles described were lack of faculty awareness, absence of faculty role models, lack of funds for curriculum development, lack of emphasis by health care policymakers, poor acceptance by students, and the notion that health education material is "not on the boards."

Discussion

The results indicate that most medical schools do make provisions for health education instruction, in the areas of both patient education and community health promotion. Despite the possibility of schools' overreporting their educational activities, these results differ substantially from the findings of an earlier study by Kahn and colleagues.[8] The difference may be due partly to the fact that the previous study examined only courses in interpersonal skills and not the undergraduate curriculum as a whole. Nevertheless, the present findings regarding educational programs in the majority of institutions (with several other schools reporting new programs being developed) are encouraging.

Table 1

Medical School Departments Involved in Health Education Programs, 1990–91*

Department†	Schools Teaching Patient Education (n = 63)		Schools Teaching Community Health Promotion (n = 72)	
	No.	%	No.	%
Family medicine	31	49	43	60
Community/preventive medicine	19	30	47	67
All departments	17	27	2	3
Internal medicine	16	25	10	14
Pediatrics	6	10	2	3
Psychiatry	5	8	1	1
Others	9‡	14	7§	10

*In 1990–91 the author surveyed all 126 U.S. medical schools to examine the status of teaching programs on health education; 97 schools responded, indicating that 63 of them teach patient education and 72 teach community health promotion. The schools also listed their departments that are involved in teaching the two areas of health education. (Percentages may total more than 100% because responsibilities are frequently assumed by more than one department.)

†For patient education, six schools (10%) listed courses in introduction to clinical medicine/doctor–patient relationship as providing instruction.

‡Other departments were obstetrics–gynecology, psychology, behavioral sciences, surgery, and pharmacology.

§Other departments were obstetrics–gynecology, public health, medical humanities, and surgery. In addition, "interdepartmental" and courses in introduction to clinical medicine were listed.

The opinion measures on the questionnaire yielded highly favorable rankings from the contact persons. However, these items do not represent a definitive measure of attitudes toward health education instruction among all medical educators. Neither the population of this study (which included only one representative of each institution) nor the structure of the questionnaire (which included only eight items for each area) was sufficient to formulate a complete measure of attitudes. Despite those limitations, the positive responses of the study population are encouraging to proponents of undergraduate health education instruction.

The most prevalent obstacle to health education instruction identified in this study was lack of curriculum time. Demands on curriculum time will only increase in the future as the realm of medical knowledge continues to expand. The distribution of curriculum time is a reflection of the values of the administrators and educators who conduct curriculum development. If health education skills are to gain importance in medical education, commitment must begin at the highest levels.

While this study revealed that most institutions make provisions for the training of health education skills, the data neither prove nor disprove the adequacy of those efforts or the overall importance of health education skills in the undergraduate medical curriculum. Thus, much more research is needed to determine the effectiveness of medical education in training physicians to be successful in educating patients.

The author acknowledges the support of the Ohio State University Department of Family Medicine and the guidance of Larry Gabel, Ph.D. Special thanks to Dr. Donald Bosshart, Dr. Donna Falvo, and Jeanne Huba, M.S., for critical review of the questionnaire; Dr. Larry Miller and Dr. Larry Sachs for intellectual support and review of manuscripts; and Jill Clutter, M.S., for statistical support.

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Teaching the Process of Obtaining Informed Consent to Medical Students

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Abstract—This paper describes a unit on the informed consent process taught to 119 first-year students at the Michigan State University College of Osteopathic Medicine in 1988-89. The unit consisted of a pretest and a posttest, a lecture, readings, small-group discussions, a model videotaped interview, and the students' videotaped interviews with one of two simulated patients. In the interviews, the students were most successful in establishing rapport and engaging the patients in discussions of treatment alternatives, and were less successful in perceiving the patients as unique individuals and in dealing with situations that involved conflict or confrontation. The authors suggest that curricula can be enhanced by focusing on the importance of patients' participation in the informed consent process. *Acad. Med.* 67(1992):598-600.

Informed consent within the doctor-patient relationship has legal, ethical, social, and emotional ramifications for both patients and physicians. Currently, in the United States, a competent adult patient has the legal and ethical right to make decisions regarding medical treatments. The patient has the right to be informed about the nature of the existing condition, the purpose of treatment, and specific risks and benefits associated with alternative treatments.[1]

In theory, informed consent has been accepted as an essential component of the doctor-patient relationship; in actuality, physicians frequently fail to communicate elements essential for informed participation by patients.[2] There are several reasons physicians may be reluctant to disclose appropriate information to patients.[3-5] However, although many physicians favor a relatively noninformative, paternalistic approach to the doctor-patient relationship, studies reveal that most patients desire more relevant information about their conditions, including specific facts regarding their diagnoses.[6] The failure of physicians to discuss relevant information with patients, and the patients' perception that physicians are unwilling to spend time listening to their concerns, are two factors most often associated with malpractice suits.[7] Moreover, in view of social changes germane to improved health care, growing public awareness of medical matters, and new therapies that necessitate increased patient cooperation, it becomes expedient for physicians to involve patients in discussions about their health care.[4]

Despite pressures to integrate the informed consent concept into routine doctor-patient relationships, few physicians have received formal instruction in the process. Usually, a physician's exposure to the informed consent process is through observation of other physicians as they function in accordance with established hospital policies. Learning is restricted, as these interactions seldom depict the informed consent process fully or accurately.[5] It should be noted that on those occasions when the concept of informed consent is formally addressed in medical school, it typically takes the form of a brief, superficial lecture in the preclinical medical ethics curriculum.[8]

In response to the paucity of instruction in medical curricula relating to informed consent, the authors

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How the Topic of Homosexuality is Taught at U.S. Medical Schools

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Abstract—In 1991 the authors surveyed all U.S. medical schools to assess both the number of curriculum hours devoted to the topic of homosexuality and the instructional strategies employed in its academic treatment; responses were sought from faculty with responsibility for teaching the topic (mostly directors of medical student education in psychiatry). Of the 126 schools, 82 (65%) responded. The mean number of hours reported was 3 hours and 26 minutes, with significant differences based on geographic region. The most frequently cited strategy was lectures in human sexuality, followed distantly by panel presentations and meetings with gay men or lesbians (both health care providers and others). To enhance sensitivity and comfort with gay and lesbian issues and to counter stereotypic responses, the authors propose that the topic of homosexuality be wholly integrated throughout the curriculum. *Acad. Med.* 67(1992):601–603.

Among the areas assessed in our recent survey of support services for gay and lesbian medical students was the way in which the subject of homosexuality was addressed in the medical school curriculum.[1] The perception of 72 students (self-identified as homosexuals) at 61 schools was that the topic was taught mainly through lectures in human sexuality, despite their reported preference that it be addressed in all course work.

Results of the original study stimulated further exploration of how faculty with curricular responsibility for presenting information on homosexuality view the topic's academic treatment at their institutions. Students at different levels of training are necessarily limited in their views of the entire curriculum, while it is likely that faculty would have a more inclusive perspective.

Method

One of the authors (MMW) designed a brief questionnaire to assess the number of curricular hours devoted to the topic of homosexuality, instructional strategies currently employed, and additional desirable ways in which the subject might be effectively addressed. We surveyed all 126 U.S. medical schools accredited by the Liaison Committee on Medical Education of the Association of American Medical Colleges and the American Medical Association. The questionnaire was distributed in June 1991 at the annual meeting of the Association of Directors of Medical Student Education in Psychiatry; directors not attending the meeting were sent a copy by mail. Each director was asked whether another department presented information on homosexuality and, if so, to identify the appropriate contact person for follow-up. In the 13 cases where multiple responses were received, statistics for the institution were pooled.

Results

Of the 126 schools surveyed, 82 (65%) completed the questionnaire. The responses came from 38 states and the District of Columbia, with more from the South (30) and the North Central region (25) and fewer from the Northeast (17) and the West (10). While large schools (137 or more students) and small schools (fewer than 137 students) were almost equally represented (51% and 49%, respectively), more responses came from public schools (67%) than from private schools (33%). (The designation of school size was based on the criterion used in our previous survey.)

No significant differences were found on the basis of class size or institutional affiliation. However, the mean number of curriculum hours devoted to the topic of homosexuality was greatest in the West (5 hours and 56 minutes versus 2 hours and 37 minutes or less for the other regions, $p < .05$). The mean response for all the schools, regardless of region, was 3 hours and 26 minutes. Overall, the most commonly reported instructional strategy was lectures in human sexuality, followed distantly by panel presentations and meetings with gay men or lesbians, both health care providers and others. Table 1 summarizes these findings.

After answering questions concerning specific instructional strategies, the faculty were asked to specify other methods used in presenting information on homosexuality; the most frequently cited was small-group discussion (11 schools). Only one faculty member reported gay and lesbian issues as being "integral to most current teaching" (which was the expressed preference of the students in our previous survey). Eight faculty indicated the topic's total absence in the curriculum, a disturbing finding, identical in percentage to the earlier report by the students. One director reported that homosexuality is addressed only in the context of illness related to HIV (human immunodeficiency virus); in all, 12 faculty members indicated the topic's treatment in the discussion of acquired immunodeficiency syndrome (AIDS).

As to additional desirable ways in which the topic might be effectively

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Table 1

Instructional Strategies and Curriculum Hours Devoted to Teaching about Homosexuality in 82 Medical Schools, 1991*

	% and No. Schools Using Strategy (n = 82)									
	In at Least One Year		In Freshman Year		In Sophomore Year		In Junior Year		In Senior Year	
Strategy	%	No.	%	No.	%	No.	%	No.	%	No.
Lecture(s) on human sexuality	79.3	65	40.2	33	45.1	37	9.8	8	2.4	2
Meetings with gays and lesbians	40.2	33	19.5	16	20.7	17	2.4	2	0.0	0
Panel presentation on human sexuality	40.2	33	20.7	17	20.7	17	0.0	0	0.0	0
Case vignettes in psychiatry	31.7	26	3.7	3	9.8	8	20.7	17	4.9	4
Film	25.6	21	9.8	8	0.0	0	1.2	1	0.0	0
Lecture(s) on medical ethics	19.5	16	14.6	12	4.9	4	2.4	2	1.2	1
Case vignettes in physical diagnosis	19.5	16	2.4	2	13.4	11	3.7	3	1.2	1
Case vignettes in medicine	11.0	9	0.0	0	2.4	2	7.3	6	2.4	2
Panel presentation on medical ethics	9.8	8	6.1	5	3.7	3	0.0	0	0.0	0

Mean No. Hours Devoted to Teaching about Homosexuality				
Total	Freshman Year	Sophomore Year	Junior Year	Senior Year
3 hr, 26 min	1 hr, 17 min	1 hr, 29 min	29 min	11 min

*In 1991 the authors surveyed appropriate faculty (mostly directors of medical student education in psychiatry) at all 126 U.S. medical schools to assess both the number of curriculum hours devoted to the topic of homosexuality and the instructional strategies employed in its academic treatment; faculty from 82 schools (65%) responded.

addressed, the faculty members' open-ended responses included "use of case material throughout the curriculum" (three schools), "integration throughout the clinical years" (three schools), and "inclusion in physical diagnosis and interviewing" (two schools). Two faculty members expressed the need — and their desire — to reduce prejudice against homosexuality, with their planned approaches unspecified.

Discussion

The respondents in our previous study of the academic treatment of homosexuality were gay and lesbian medical students at all levels of training. Although admittedly they are a select group, it is likely that their vested interest in the topic assured a thoughtful, reasoned response. However, a downside of their varied levels of training is that the students in the basic science years were not likely to be aware of the topic's subsequent academic treatment in the clinical years.

In contrast, a more inclusive perspective would be expected of faculty with responsibility for presenting information about homosexuality. We initiated our inquiry with directors of medical student education in psychiatry, based on the conventional wisdom that the topic is most often included first in the behavioral sciences and later in psychiatry training. But we encouraged each director to identify appropriate contact persons for follow-up in departments other than his or her own.

For 45 cases representing 39 institutions, we were able to match the responses of the students from our previous study with those of the faculty from the present study; response agreement between the two groups was 70% across all the strategies. In the cases in which a faculty member's report of a utilized strategy contradicted the corresponding student's report (19%), it is likely that the student's exposure to the method may occur later in his or her training. More difficult to explain are the infrequent cases (11%) in which a student indicated a particular strategy's use in contradiction to a negative report by a faculty member. Such occurrences may represent the latter's lack of knowledge concerning the subject's academic treatment by another department; this possible lack of knowledge is one limitation of our study.

The major findings of the current study are remarkably consistent with those of our earlier research. The faculty and the students agreed that the topic of homosexuality is taught mainly through lectures in human sexuality, followed distantly by panel presentations and meetings with gay men or lesbians. Such marginalization in the curriculum may trivialize the topic's importance in the minds of both faculty and students.

In responding to our query of how the subject might be effectively addressed, one faculty member suggested the need for "an acceptable, less threatening way to teach it." This apparent lack of comfort in discussing gay and lesbian issues may be due to lingering remnants of homosexuality's earlier association with deviance and psychopathology. It may also be related to its frequent current inclusion in instruction regarding HIV, thus linking homosexual identity—and not high-risk behaviors irrespective of sexual orientation—with a frightening pandemic illness.

Perhaps the students' recommendation (shared by three faculty members) that the topic be addressed across the entire spectrum of medical education should be followed. We propose that teaching about the care of gay and lesbian patients be wholly integrated throughout the curriculum, from the basic sciences and introductory clinical courses through the full range of clinical experiences. Only in that way can faculty members' and students' sensitivity and comfort with gay and lesbian issues be enhanced, and stereotypic responses be countered.

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Assessing Personal Occupational Safety and Health Training for Students at U.S. Medical Schools

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Abstract—Medical students potentially are exposed to numerous occupational hazards. This study examined the training and preventive measures medical schools use to protect the health and safety of students. In late 1990, questionnaires were mailed to the 126 schools in the United States. One hundred (79%) responded, reporting numerous incidents of illness and injury. Of the 100 schools, 60 agreed with the statement that their students were adequately prepared to work safely; 11 disagreed, and 24 gave neutral responses (five did not respond to the statement). However, 36 indicated that they planned to revise health and safety training. The authors recommend that schools adopt policies, procedures, and a uniform curriculum regarding students' occupational safety and health. *Acad. Med.* 67(1992): 603–605.

Health care workers employed at medical schools and teaching hospitals routinely encounter a wide variety of occupational hazards.[1,2] As a result, training in health and safety is now required to reduce workers' risks of injury and illness. Unfortunately, medical students, who represent a significant portion of the health care work force within teaching institutions, are not always included in formal health and safety training programs.

We surveyed medical school administrators about students' injuries, illnesses, immunizations, and training in occupational safety and health. Information was also collected on institutional policies regarding potential health and safety hazards that medical students face during their training.

Medical students often are unaware of potential environmental hazards during their training.[3] Moreover, proper training seems to be lacking at the undergraduate level, especially with regard to safe laboratory practices.[4] Lack of training is compounded by the lack of reporting of injuries and illnesses among health care workers.[5] Thus, the data on the frequency of illness and injury among medical student health care workers are inadequate and may be inaccurate.

Method

Questionnaires were mailed to the deans of student affairs and the deans of the medical schools at the 126 institutions in the United States. After approximately eight weeks, a second mailing was sent to nonrespondents. There were no identifiers on the questionnaire to link any response to a particular school. Primarily descriptive statistics were used to analyze the data.

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Comparing the Transfusion Medicine Content of the NBME's Examinations in 1984–1985 and 1989–1990

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Abstract—Recognition of the seriousness of transfusion-transmitted diseases has been demonstrated by U.S. medical schools through the integration of transfusion medicine (TM) content into their curricula. To evaluate the degree to which these changes in curricula have been reflected in the National Board of Medical Examiners' (NBME) examinations, a study conducted in 1991 evaluated the proportions of TM-related items on Parts I and II of the NBME examinations for 1984–1985 versus 1989–1990. Both Part I (basic sciences) and Part II (clinical sciences) demonstrated significant gains in TM items between the comparison periods ($p < .001$), with Part II having the higher gain. An analysis of students' knowledge revealed that students in 1989–1990 tended to perform better on TM items than on examination items generally. The increases in TM content and student performance on TM items on the 1989–1990 examinations suggest that the national effort to expand and improve teaching of TM in U.S. medical schools has been effective. *Acad. Med.* 67(1990):608–610.

Transfusion medicine (TM) has evolved during the last quarter century from traditional blood banking, primarily concerned with crossmatching and blood storage, into a complex clinical and research discipline.[1] U.S. medical schools' curricula have reflected the emergence of TM through integration of TM topics into existing courses and the addition of required and/or elective courses in TM.[2] Transfusion medicine education has gained momentum in medical education primarily for three interrelated reasons: (1) the increasing complexity of transfusion practice; (2) the Transfusion Medicine Academic Awards (TMAA) for faculty and curriculum development provided by the TMAA group of the National Heart, Lung, and Blood Institute; and (3) the recognition of the seriousness of transfusion-transmitted diseases.

In 1986 some of the TMAA awardees formed a task force to assess the status of TM in medical education through an analysis of the TM content of Part I and Part II of the 1984 and 1985 National Board of Medical Examiners' (NBME's) tests.[3] The NBME tests were selected as a measure of TM because they "are a reflection of the content of U.S. medical curricula," according to the Council on Medical Education of the American Medical Association.[4]

The 1986 TM task force found that approximately 5% of Part I and 2% of Part II items of the 1984–1985 tests were related to TM. In the five years since that study was conducted, TM has continued to gain momentum in undergraduate medical education: 15 additional TMAAs have been granted to individuals affiliated with medical schools, and the impact of AIDS (acquired immunodeficiency syndrome) on medical education has continued to increase. Therefore, in 1991 a new TM task force was created to determine the degree to which the examinations reflect the increased TM content of medical school curricula. A second goal was to assess students' knowledge of TM content. The findings of this replication study were compared with the baseline data gathered on the 1984–1985 NBME examinations.

Method

Four physicians specializing in TM and four educators affiliated with the TMAA program constituted the 1991 task force. Of these, three physicians and one educator had been members of the original task force. Each item from the June Part I administration and the April Part II administration of the 1989 and 1990 NBME examinations was reviewed by two or more TM physicians and coded as "related" or "not related" to TM. For the items related to TM, the physician raters coded the items into topic areas, using as coding categories the curriculum objectives of the curriculum committee of the TMAA group.[5] Chi-square tests were used to compare the data from the 1989–1990 examinations with those from the 1984–1985 examinations.

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Table 1

Comparison of the Mean Difficulty Indices, Numbers, and Percentages of (1) Transfusion Medicine Items and (2) All Test Items on the NBME Part I and Part II Examinations in 1984 – 1985 and 1989 – 1990*

	Transfusion Medicine Items					All Test Items				
	Mean Difficulty Index as %†			No. and (%) Items		Mean Difficulty Index as %†			No. Items	
NBME Section	1984 – 1985	1989	1990	1984 – 1985	1989 – 1990	1984 – 1985	1989	1990	1984 – 1985	1989 – 1990
Part I										
Anatomy	70	98	67	6 (2)	2 (1)	69	67	63	284	238
Physiology	81	59	77	7 (2)	9 (4)	70	66	66	281	237
Biochemistry	64	72	72	22 (8)	18 (7)	66	62	62	280	242
Pathology	64	71	56	24 (9)	29 (12)	65	66	65	281	243
Microbiology	70	67	70	25 (9)	44 (18)	66	64	66	275	242
Pharmacology	65	73	67	11 (4)	16 (7)	66	64	65	271	225
Behavioral sci.	NA	74	74	0 (9)	6 (3)	66	62	65	269	244
All sections	67	70	68	95 (5)	124 (7)	66	64	65	1,941	1,671
Part II										
Medicine	70	72	73	15 (9)	30 (12)	66	69	66	307	260
Surgery	69	74	67	7 (2)	25 (10)	65	65	58	305	252
Ob. – gyn.	66	60	62	10 (3)	18 (7)	63	65	61	304	258
Prev. med – public health	56	82	75	3 (1)	26 (10)	67	70	70	303	261
Pediatrics	47	71	76	10 (3)	25 (10)	63	63	63	303	258
Psychiatry	NA	37	75	0 (0)	2 (1)	64	64	66	301	257
All sections	64	71	72	45 (2)	126 (8)	64	66	64	1,832	1,546

*A national task force in transfusion medicine (TM) was created in 1991 to (1) determine the degree to which the National Board of Medical Examiners (NBME) Part I and Part II examinations reflected increased TM content in medical school curricula, and (2) assess students' knowledge of TM content. Data from the examinations of 1984 – 1985, collected by a previous task force, were compared with data from the 1989 – 1990 examinations.

†A mean difficulty index is the average of the percentages of students who gave correct answers per item within an NBME section. For example, for the TM items in the anatomy section in 1990, an average of 67% of the students correctly answered a given item.

Results

A total of 3,217 items, 1,671 from Part I and 1,546 from Part II, of the 1989 – 1990 examinations were reviewed. Of those items, 250 (7.7%) were identified as TM-related, in contrast to 140 (3.7%) in 1984 – 1985 (see Table 1). A significant increase in the number of items for the combination of Part I and Part II of the 1989 – 1990 versus 1984 – 1985 examinations was obtained ($p < .001$), with Part II having the greater increase. More specifically, the number of TM-related items on Part I increased from 95 (5%) in 1984 – 1985 to 124 (7.4%) in 1989 – 1990. On Part II, TM-related items increased from 45 (2%) in 1984 – 1985 to 126 (8.2%) in 1989 – 1990 ($p < .001$).

On the 1989 – 1990 examinations, microbiology section (44 items) and the medicine section (30 items) had the highest numbers of TM items. The greatest gains in TM items on Part II were in the surgery section, from seven (2%) to 25 (10%), and the preventive medicine/public health section, from three (1%) to 26 (10%).

The TM items of the 1989 – 1990 examinations covered nine of the 12 topic areas recommended for medical school curricula by the curriculum committee of the TMAA group. The curriculum committee recommended that curricula cover the following topic areas within TM: history, scientific basis, blood components, crossmatching, clinical transfusion, reactions, autoimmunity, transplantation, pheresis, blood substitutes, medicolegal, and policy and organization. The majority of TM items on the NBME examinations focused either on the scientific basis of TM (37%) or on clinical transfusion (23%).

In 1989 – 1990 students tended to score better on TM items than on examination items generally, whereas in 1984 – 1985 they had tended to score about the same.

Discussion

The 1989 – 1990 NBME Part I and II tests clearly demonstrated a greater emphasis on TM content than did the 1984 – 1985 examinations. In particular, the large increase in TM items on Part II indicates a stronger representation of TM on the clinical portion of the examinations. The results of this study reflect a trend toward a clinical orientation for TM as the discipline moves from "the laboratory to the bedside."[1]

The improved performance on TM items may be related to several factors, including the increased awareness of HIV (human immunodeficiency virus) and AIDS and the infusion of additional resources by the National Heart, Lung, and Blood

Institute to support teaching activities in this area. Faculty and students are becoming increasingly aware of risks and safety issues in blood transfusion, the need for conservation of blood, and the growing practice of autologous blood transfusions. These factors have contributed to the increased numbers of clinical questions on the NBME examinations.

While some extraneous factors may have contributed to the changes on the NBME examinations (i.e., the NBME's selection of faculty panels who compile the NBME and the tests' increasingly interdisciplinary nature), the increases in TM content and student performance on TM items indicate that the growing emphasis on TM in U.S. medical school curricula, as well as on development of TM faculty, has been effective.

This study was supported in part by the Transfusion Medicine Academic Award group from the National Heart, Lung, and Blood Institute.

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Attitudes of Medical School Faculty toward Gifts from the Pharmaceutical Industry

JAMES W. BANKS III, M.D., and ARCH G. MAINOUS III, Ph.D.

Abstract—The American Medical Association (AMA) has recently published guidelines for the receipt of gifts from industry representatives. To examine faculty members' attitudes toward that AMA policy as it pertains to gifts from the pharmaceutical industry, the authors surveyed the faculty of the University of Kentucky College of Medicine in 1991. Of 462 faculty members, 248 (54%) completed the questionnaires. The faculty generally agreed with the AMA guidelines. A majority of the faculty believed that personal relationships had the potential to influence prescribing patterns but that gifts, in general, did not greatly influence prescribing behaviors. Compared with the 169 M.D. faculty, the 69 Ph.D. faculty significantly favored more restrictive policies ($p < .001$). The authors discuss both the ethical considerations and the utility of guidelines for physician-industry interactions. *Acad. Med.* 67(1992):610-612.

Much controversy surrounds the issue of physicians' receiving gifts from pharmaceutical and other health industry representatives. The American Medical Association (AMA) and the American College of Physicians (ACP) have recently published guidelines for gifts to physicians from industry.[1,2] Other specialty societies have either adopted or endorsed the AMA's or the ACP's guidelines.[3-5]

Little systematic study has investigated whether pharmaceutical industry gifts influence physicians' prescribing habits. A survey of internal medicine faculty and residents found that the physicians generally had negative attitudes toward the clinical information provided by pharmaceutical representatives, and a majority favored eliminating pharmaceutical presentations at their hospitals.[6]

Medical school faculty members' acceptance of gifts and interaction with industry representatives may have far-reaching influence through the modeling of behavior to students and residents and through the dissemination of information in the role of an expert. The purpose of our study was to examine the attitudes of medical school faculty toward the AMA guidelines regarding gifts from industry representatives.

Method

A self-administered questionnaire was mailed to the 462 full-time fac-

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Transitions 5A

Publishing Services: Hanley & Belfus, Inc.
210 South 13th Street, Philadelphia, PA 19107

OCTOBER 1992
VOLUME 67
NUMBER TEN

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Academic Medicine (ISSN 1040-2446) is owned and published monthly by the Association of American Medical Colleges, 2450 N Street, NW, Washington, DC 20037. Publishing services by Hanley & Belfus, Inc., 210 South 13th Street, Philadelphia, Pennsylvania 19107. Second-class postage paid at Washington, DC and additional mailing offices.

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Subscription rates: U.S., Canada, Latin America—$60.00/1 year; $110/2 years; $155/3 years, $30.00/year for students; and $7.00 per single copy. All other locations—$70.00/1 year; ($40.00/1 year for students); $130/2 years; $185/3 years, and $7.00 per single copy.

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ORIGINAL CONTRIBUTIONS

ARTICLES

Specialty Selection and Success in Obtaining Choice of Residency Training among 1987 U.S. Medical Graduates by Race–Ethnicity and Gender

WENDY L. COLQUITT, M.A., IDELLE PRICE SMITH, M.S.W., M.P.H., and
CHARLES D. KILLIAN, M.A.

Abstract—The authors developed baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), compared by gender and race–ethnicity. They focused on primary care specialties and obstetrics–gynecology versus all other specialties, and sought to identify group differences in (1) patterns of specialty preference, (2) evolution of specialty choice from before to after medical school, (3) success in attaining the first choice of specialty through the NRMP, and (4) patterns in switching from an alternate specialty (ranked second or lower) to the first-choice specialty between the first and second years of residency training. The results showed substantial intergroup and intragroup variations, both before and after medical school, for family practice, internal medicine, and obstetrics–gynecology. Examination of NRMP outcomes revealed that the underrepresented-minority (URM) graduates, particularly men, were less successful both in achieving any match and in matching to their first-choice specialties. Analyses of patterns in switching specialties revealed several important facts about those who were matched to alternate specialties: (1) over half entered their first-choice specialties in the second year; (2) women had more success in switching to their first-choice specialties than did men, particularly among the URMs; (3) among those who received alternate specialties, the URM women were more likely than the URM men to leave graduate medical education by the second year (reversing the trend for the other groups); and (4) individuals whose alternate specialties were in primary care were much less likely to switch to their first-choice specialties. *Acad. Med.* 67(1992):660–671.

This study developed baseline data on specialty selection and on success in obtaining residency positions. It examined by gender and racial–ethnic group the differences in patterns of specialty preferences before and after entry into medical school, senior medical students' successes in attaining their first choices of specialty through the National Resident Matching Program (NRMP), and the stability of medical students' specialty selections in the first and second years of residency training. We focused special attention on career choices in the primary care specialties and obstetrics–gynecology.

Variation over time in specialty choices has been a popular research topic, but few studies in the last several years have documented the patterns and evolution of specialty choices using national data.[1–3] Previous studies found gender and minority-group differences in specialty preferences at various points in training,[4–7] but none examined variations in specialty preference by both gender and race–ethnicity.

Our study also analyzed the relative success ~~of senior~~ medical students in obtaining their first choices of specialties in the NRMP, the system through which medical students and U.S. residency training programs are matched. The system uses a computer algorithm to match students with programs, using the rank-ordered preferences of each. Previous research on NRMP outcomes has drawn on both individual-level and aggregate-level data. In a 1990 study using detailed NRMP rank-order selection data to examine whether students or programs were more successful in getting their desired matches,[8] the researchers concluded that students were more successful. However, because the authors examined all students as a group, they were not able to detect whether some groups of students were more successful than others.

NRMP outcomes have been studied with aggregate data in several ways. The lower match rates experienced by underrepresented minorities have been documented for several

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years,[9-11] although it is possible that many of these students obtained residency positions outside the NRMP.[12,13] Additionally, some research suggests ways in which the match process, specifically the programs' ranking procedures with regard to minority applicants, may be biased against minority applicants as a whole.[9] To address questions about how minority students fare in the NRMP, we sought to determine whether minority and nonminority applicants differed in the extents to which they (1) matched to any program, (2) matched to their first choices of specialties, or (3) were able to obtain their first specialty choices for their second postgraduate year (PGY-2) of medical education.

Method

We examined the three issues just described in regard to the 1987 U.S. medical school graduates who participated in the 1987 NRMP. In 1987 there were 16,126 U.S. graduates, 90% of whom (14,450) participated in the 1987 Match. The gender and racial–ethnic proportions of these match participants were representative of the 1987 U.S. medical school graduating class, with the exception of African Americans and Puerto Ricans, both of whom were underrepresented in the NRMP.

Data for this research were obtained from the Association of American Medical Colleges' (AAMC's) Student and Applicant Information Management System (SAIMS) and from the NRMP. Information on the specialty preferences of premedical students is collected annually on the Premedical Student Questionnaire (PMQ), a survey completed as part of registration for the Medical College Admission Test (MCAT). The first choices of specialty training upon completion of medical school were considered to be the specialties of the programs that the students ranked highest on their NRMP rank-order lists. Match specialties were the actual specialties in which the 1987 senior medical students obtained their first postgraduate year (PGY-1) residency positions through the NRMP. The types of residencies in which the students were found in PGY-2 were available through the AAMC's graduate medical education (GME) tracking census. Information was also available on various other nonresidency training activities in which individuals may be engaged, such as research, taking a year off, entering medical practice, or leaving GME.

The measurement of specialty stability and switching in the first two years of residency training was based on each specialty board's certification requirements (as presented in the *1988–1989 Directory of Graduate Medical Education Programs Accredited by the Accreditation Council for Graduate Medical Education*). The requirements were used to determine the consistency of the specialty entered in the second year of residency with the NRMP first choice of specialty.

The analyses focused on differences by gender and racial–ethnic group in terms of the graduates' specialty preferences, consistency or change in specialty preferences, and experiences in the NRMP. We used the designations that previously have been used in the population parity model to identify racial–ethnic groups underrepresented in medicine. The *underepresented minority* (URM) groups were Native Americans (American Indians and Alaskan Natives), Mexican Americans, Mainland Puerto Ricans, and African Americans (comprising all 761 graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents). *Other-minority* groups, not underrepresented in medicine but included in the analysis, were Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanics other than Puerto Ricans and Mexican Americans. Whites not of Hispanic origin constitute the majority of medical graduates and residents and were referred to in this study as the *nonminority* group.

Our study focused on identifying patterns in the selection of primary care specialties versus other specialty fields among the 1987 medical graduates. The primary care specialties were considered to be family practice, general internal medicine, and pediatrics. Additional comparisons were made between obstetrics–gynecology and other specialties. Since data on practice plans were not available for this research, the analysis of primary care specialties had to begin with the graduates' NRMP first choices of specialty and so must be interpreted cautiously. The data may overestimate the participation of individuals in primary care because some may later have sought to subspecialize. However, the purpose of this research was not to estimate the supply of primary care practitioners but instead to compare intergroup differences in specialty preferences and outcomes at different points in medical training, particularly during the period of the NRMP match and the years immediately following.

The analysis presents crosstabulated data on the specialty preferences, NRMP experiences, and actual residency specialties of the 1987 graduates with their gender and racial–ethnic status. The tables include counts and proportional distributions for each group. Inferential statistics commonly used to indicate the presence or absence of a relationship are not necessary for this research, since this study examined an entire population (i.e., the 1987 U.S. medical school graduates). In each section of this study, we report notable percentage differences (in most cases, 3% or more). A three-percentage-point difference can represent large and substantive differences between groups. For minority-group and gender comparisons especially, the absolute numbers reflected by these differences are important. Since our purpose was to develop baseline data, a decrease in the proportional differences between groups is meaningful; for example, the change from a six-percentage-point difference between groups in primary care preference before medical school to a three-percentage-point difference at the end of medical school is important. Findings of similarities between groups as well as large differences are important.

Results

Overall, the results showed that the differences between URMs and others in the preference for primary care careers observed before medical school had diminished by the end of medical school. The differences between preferences for primary care specialties were greater among URM groups than between URMs and other minorities or between URMs and nonminorities. We found substantial differences in the NRMP outcomes by racial–ethnic group and also differences in the patterns of attrition and PGY-2 training for those who matched to alternate specialties (ranked second or lower for the NRMP).

Pre–Medical-school Specialty Preferences

Substantial differences among racial–ethnic groups' pre–medical-school preferences were found for family practice, general internal medicine, and obstetrics–gynecology (shown in Table 1). Family practice included those indicating either family practice or general practice on the PMQ. While racial–ethnic differences were minor in preferences for pediatrics, gender differences were substantial.

Family practice. Family practice attracted nearly equal proportions of URM (27%) and nonminority (25%) pre–medical-school students but substantially fewer of other minorities (18%). The two largest URM groups, African Americans and Mexican Americans, differed considerably in their preferences for family practice: 40% of Mexican Americans but only 23% of African Americans preferred family practice. The greater family practice interest among Mexican Americans was due to the unusually high percentage of Mexican-American men citing this career (44%). However, Mexican-American women were more likely to indicate a future career in family practice (33%) than were all other racial–ethnic groups of women except Native-American women (50%).

Internal medicine. General internal medicine was preferred at the same rate (7%) by URM and nonminority students and slightly more by other-minority students (9%).

Obstetrics–gynecology. Differences were also noted in preferences for obstetrics–gynecology. URM students were more likely to select obstetrics–gynecology than were nonminority or other-minority students (8% compared with 3% and 4%, respectively). This difference was even more pronounced when gender was considered, because URM women preferred this specialty more than did other women, and URM men preferred it more than did other men. In addition, gender alone was found to be a significant factor in pre–medical-school choice of obstetrics–gynecology. Women chose obstetrics–gynecology up to nine times as often as did men (URMs, 14% versus 4%; other minorities, 9% versus 2%; and nonminorities, 9% versus 1%). The greater pre–medical-school preferences observed among URM men was due to the higher preference rate of African-American men (5%) relative to other men. The greater preference for obstetrics–gynecology of URM women relative to other women resulted from the very high proportions of African-American women, Mexican-American women, and Mainland Puerto Rican women choosing this specialty (13%, 17%, and 22%, respectively).

Pediatrics. Women of all groups indicated a desire to enter pediatrics more frequently than did men (URMs 14% versus 7%; other minorities, 14% versus 6%; and nonminorities, 11% versus 7%). URM and other-minority women were somewhat more likely to select pediatrics than were nonminority women.

Combined primary care. The preference rates for the combined primary care specialties show that the largest difference was between URM and other-minority students. About 43% of URM students compared with 36% of other minorities preferred a primary care specialty. Most of this difference reflected the much greater preference for family practice among URMs. The 40% proportion of nonminority students fell midway between those of the students in the URM and other-minority groups.

When obstetrics–gynecology was included with the primary care specialties, the proportion of URMs interested in primary care was greater than the proportions of other minorities and nonminorities (52% versus 42% and 45%).

Specialty Preferences as Seniors

These preferences were measured by the students' first choices in the NRMP. By the end of medical school, the same three specialties that had differed substantially by minority group status at the premedical stage (family practice, internal medicine and obstetrics–gynecology) continued to attract racial–ethnic groups at different rates. These data are presented in Table 2.

Family practice. Family practice attracted URM senior medical students at the highest rate (14%), followed closely by nonminority students (13%), and more distantly by other-minority students (7%). Patterns of variation within the URM group were similar to those found at the premedical stage: African-American students selected family practice in about the same proportion as did nonminority students (12% versus 13%), while Mexican-American students chose it about twice as often (25%). Also, as was found at the pre–medical-school stage, Mexican-American men were more likely to choose family practice than were Mexican-American women (29% versus 17%), and the rate for Mexican-American women remained higher than the rate for all other groups of women except Native-American women (18%).

Internal medicine. Internal medicine programs were first-ranked most often by other-minority students (30%), followed by URM students (25%) and nonminority students (23%). These rates did not differ substantially for men and women in each group.

Obstetrics–gynecology. Smaller dif-

Table 1

Pre–Medical-school Specialty Choices of 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	Pre-Medical-school Specialty Choice												
	No Response		Family Practice		Internal Medicine		Pediatrics		Obstetrics–Gynecology		All Others		Total No. in Row
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Women													
Underrepresented minority													
African American†	27	8.0	72	21.4	19	5.6	48	14.2	45	13.4	126	37.4	337
American Indian, Alaskan Native	3	10.7	14	50.0	2	7.1	2	7.1	1	3.6	6	21.4	28
Mexican American	4	5.3	25	33.3	2	2.7	11	14.7	13	17.3	20	26.7	75
Mainland Puerto Rican	1	3.7	2	7.4	1	3.7	4	14.8	6	22.2	13	48.1	27
Other minority‡	60	14.3	80	19.0	33	7.9	58	13.8	36	8.6	153	36.4	420
Nonminority§	469	12.3	917	24.0	195	5.1	417	10.9	331	8.7	1,490	39.0	3,819
Unknown	20	40.8	6	12.2	3	6.1	2	4.1	5	10.2	13	26.5	49
Total	584	12.3	1,116	23.5	255	5.4	542	11.4	437	9.2	1,821	38.3	4,755
Men													
Underrepresented minority													
African American†	52	12.3	99	23.3	35	8.3	23	5.4	23	5.4	192	45.3	424
American Indian, Alaskan Native	6	20.0	9	30.0	2	6.7	4	13.3	0	0.0	9	30.0	30
Mexican American	10	7.1	62	44.0	9	6.4	8	5.7	3	2.1	49	34.8	141
Mainland Puerto Rican	5	10.6	15	31.9	2	4.3	8	17.0	1	2.1	16	34.0	47
Other minority‡	123	15.4	137	17.2	78	9.8	50	6.3	15	1.9	394	49.4	797
Nonminority§	1,102	13.5	2,111	26.0	579	7.1	539	6.6	78	1.0	3,725	45.8	8,134
Unknown	46	37.7	22	18.0	6	4.9	7	5.7	1	0.8	40	32.8	122
Total	1,344	13.9	2,455	25.3	711	7.3	639	6.6	121	1.2	4,425	45.6	9,695
GRAND TOTAL	1,928	13.3	3,571	24.7	966	6.7	1,181	8.2	558	3.9	6,246	43.2	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared, by the graduates' gender and race–ethnicity, the specialty preferences the graduates had indicated on the Premedical Student Questionnaire when they are registered for the Medical College Admission Test.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

Table 2

Post–Medical-school First-choice Specialties of 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	Post-Medical-school Specialty Choice										
	Family Practice		Internal Medicine		Pediatrics		Obstetrics-Gynecology		All Others		Total No. in Row
	No.	%	No.	%	No.	%	No.	%	No.	%	
Women											
Underrepresented minority											
African American†	47	13.9	82	24.3	44	13.1	49	14.5	115	34.1	337
American Indian, Alaskan Native	5	17.9	4	14.3	2	7.1	5	17.9	12	42.9	28
Mexican American	13	17.3	17	22.7	9	12.0	16	21.3	20	26.7	75
Mainland Puerto Rican	2	7.4	9	33.3	4	14.8	2	7.4	10	37.0	27
Other minority‡	32	7.6	130	31.0	63	15.0	42	10.0	153	36.4	420
Nonminority§	489	12.8	904	23.7	639	16.7	377	9.9	1,410	36.9	3,819
Unknown	4	8.2	10	20.4	7	14.3	6	12.2	22	44.9	49
Total	592	12.5	1,156	24.3	768	16.2	497	10.5	1,742	36.6	4,755
Men											
Underrepresented minority											
African American†	41	9.7	110	25.9	19	4.5	30	7.1	224	52.8	424
American Indian, Alaskan Native	7	23.3	5	16.7	1	3.3	3	10.0	14	46.7	30
Mexican American	41	29.1	36	25.5	10	7.1	6	4.3	48	34.0	141
Mainland Puerto Rican	4	8.5	11	23.4	5	10.6	1	2.1	26	55.3	47
Other minority‡	55	6.9	240	30.1	41	5.1	48	6.0	413	51.8	797
Nonminority§	1,060	13.0	1,859	22.9	462	5.7	297	3.7	4,456	54.8	8,134
Unknown	10	8.2	38	31.1	11	9.0	5	4.1	58	47.5	122
Total	1,218	12.6	2,299	23.7	549	5.7	390	4.0	5,239	54.0	9,695
GRAND TOTAL	1,810	12.5	3,455	23.9	1,317	9.1	887	6.1	6,981	48.3	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race-ethnicity, the first-choice specialties the graduates indicated on the NRMP rank lists.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

Table 3

Types of Matches Achieved through the NRMP for 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial–Ethnic Status by Gender	Matched to First and Only Choice		Matched to First of Two or More Choices		Matched to Second or Lower-ranked Choice		Did Not Match	
	No.	%	No.	%	No.	%	No.	%
Women								
Underrepresented minority								
African American†	211	62.6	82	24.3	20	5.9	24	7.1
American Indian, Alaskan Native	18	64.3	8	28.6			2	7.1
Mexican American	45	60.0	22	29.3	5	6.7	3	4.0
Mainland Puerto Rican	15	55.6	10	37.0	1	3.7	1	3.7
Other minority								
Asian, Pacific Islander	172	55.7	89	28.8	38	12.3	10	3.2
Commonwealth Puerto Rican	20	62.5	6	18.8	2	6.3	4	12.5
Other Hispanic	47	59.5	23	29.1	5	6.3	4	5.1
Nonminority‡	2,307	60.4	1,088	28.5	291	7.6	133	3.5
No response	21	42.9	20	40.8	6	12.2	2	4.1
Total	2,856	60.1	1,348	28.3	368	7.7	183	3.8
Men								
Underrepresented minority								
African American†	213	50.2	94	22.2	43	10.1	74	17.5
American Indian, Alaskan Native	14	46.7	5	16.7	2	6.7	9	30.0
Mexican American	83	58.9	34	24.1	9	6.4	15	10.6
Mainland Puerto Rican	25	53.2	13	27.7	7	14.9	2	4.3
Other minority								
Asian, Pacific Islander	172	55.7	89	28.8	38	12.3	10	3.2
Commonwealth Puerto Rican	20	62.5	6	18.8	2	6.3	4	12.5
Other Hispanic	47	59.5	23	29.1	5	6.3	4	5.1
Nonminority‡	2,307	60.4	1,088	28.5	291	7.6	133	3.5
No response	69	56.6	37	30.3	12	9.8	4	3.3
Total	5,514	56.9	2,658	27.4	898	9.3	625	6.4
GRAND TOTAL	8,370	57.9	4,006	27.7	1,266	8.8	808	5.6

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race–ethnicity, the types of match specialties (i.e., first choice of specialty or second or lower-ranked choice) received by the graduates.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Nonminority* indicates whites not of Hispanic origin.

ferences were observed in the first-choice preferences for obstetrics–gynecology. URM students selected obstetrics–gynecology at a higher rate (10%) than did other-minority (7%) or nonminority students (6%). In general, men were less likely to choose obstetrics–gynecology (URM men, 6%; other-minority men, 6%; and nonminority men, 4%). This tendency was evident at the premedical stage and had diminished only somewhat. Among women, URMs were the most likely to choose obstetrics–gynecology (15%), while the rate was 10% for both other-minority women and nonminority women.

Pediatrics. Differences were found by gender but not by racial–ethnic group in the selection of pediatrics. Overall, women ranked pediatrics as their first choice much more frequently than did men. Nonminority women selected pediatrics most often (17%), followed by other-minority women (15%) and URM women (13%); among men, other-minority men chose pediatrics least often (5%), while equal proportions of URM and nonminority men selected pediatrics (6% for each group).

Combined primary care. Despite the

racial-ethnic differences in the selections of internal medicine and family practice, when the primary care specialties (internal medicine, family practice, and pediatrics) were considered as a group, the variations were minor. About 48% of the URM students, 46% of the other-minority students, and 45% of nonminority students chose primary care specialties. When obstetrics-gynecology was included as primary care, the URM students were more likely to prefer a primary care specialty than were the nonminority students (58% versus 52%), while the rate for other-minority students was 54%. These differences were directly attributable to the greater interest of Mexican Americans in family practice and obstetrics-gynecology, the greater interest of African Americans in obstetrics-gynecology, and the greater interest among other minorities in internal medicine.

Match Outcomes

Results of the 1987 NRMP match by gender and race-ethnicity are displayed in Table 3. A large majority (85%) of the 1987 U.S. graduates who participated in the NRMP received matches to their first choices of specialties. Over 58% of the graduates participating in the NRMP ranked only one specialty for the match process. Approximately 9% matched to residencies in alternate (second- or lower-ranked) specialty preferences, and about 6% did not obtain a match to any program through the NRMP.

Rates of success and failure in achieving a match through the NRMP varied by gender and race-ethnicity. Women were more successful in obtaining their first choices of specialties (88% versus 84%). Twelve

Table 4

Match Specialties Received through the NRMP for 1987 U.S. Medical School Graduates Compared by Race-Ethnicity and Gender*

Racial-Ethnic Status by Gender	NRMP Match Specialty: Family Practice		Internal Medicine		Pediatrics		Obstetrics-Gynecology		All Others		Total No. in Row
	No.	%	No.	%	No.	%	No.	%	No.	%	
Women											
Underrepresented minority											
African American†	40	11.9	87	25.8	45	13.4	47	13.9	118	35.0	337
American Indian, Alaskan Native	5	17.9	4	14.3	2	7.1	4	14.3	13	46.4	28
Mexican American	12	16.0	16	21.3	12	16.0	15	20.0	20	26.7	75
Mainland Puerto Rican	2	7.4	10	37.0	4	14.8	2	7.4	9	33.3	27
Other minority‡	27	6.4	139	33.1	67	16.0	38	9.0	149	35.5	420
Nonminority§	475	12.4	941	24.6	638	16.7	353	9.2	1,412	37.0	3,819
Unknown	2	4.1	10	20.4	9	18.4	4	8.2	24	49.0	49
Total	563	11.8	1,207	25.4	777	16.3	463	9.7	1,745	36.7	4,755
Men											
Underrepresented minority											
African American†	34	8.0	109	25.7	18	4.2	27	6.4	236	55.7	424
American Indian, Alaskan Native	4	13.3	5	16.7	1	3.3	1	3.3	19	63.3	30
Mexican American	34	24.1	38	27.0	13	9.2	6	4.3	50	35.5	141
Mainland Puerto Rican	3	6.4	14	29.8	4	8.5	1	2.1	25	53.2	47
Other minority‡	48	6.0	234	29.4	42	5.3	40	5.0	433	54.3	797
Nonminority§	1,030	12.7	1,926	23.7	465	5.7	283	3.5	4,430	54.5	8,134
Unknown	10	8.2	38	31.1	8	6.6	5	4.1	61	50.0	122
Total	1,163	12.0	2,364	24.4	551	5.7	363	3.7	5,254	54.2	9,695
GRAND TOTAL	1,726	11.9	3,571	24.7	1,328	9.2	826	5.7	6,999	48.4	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared, by the graduates' gender and race-ethnicity, the match specialties received by the graduates.

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

percent of URM, 7% of other-minority, and 5% of nonminority students did not match. Among men, Native Americans, African Americans, and Mexican Americans had the highest non-match rates (30%, 18%, and 11%, respectively); but when they were matched to residencies, Mexican-American men were among the most successful men in obtaining their first choices of specialties. Among women, Commonwealth Puerto Ricans, African Americans, and Native Americans experienced the highest non-match rates (13%, 7%, and 7%, respectively). Women from the Commonwealth of Puerto Rico were the only group of women who were less successful in obtaining matches than were their male counterparts.

Specialties Entered in PGY-1 and PGY-2

Many of the patterns observed at the pre-medical-school level and the NRMP stage were repeated during the PGY-1 and PGY-2 residency training, a result of the high percentages of these students who received matches to their first choices of specialties (Tables 4 and 5). URM students as a group entered PGY-1 and PGY-2 residencies in family practice and obstetrics-gynecology at higher rates than did nonminority and other-minority students. Moreover, Mexican-American men showed the greatest interest in family practice. Both Mexican-American women and African-American women continued to show a greater interest than other women in obstetrics-gynecology. Furthermore, African-American men continued to show more interest than other men in obstetrics-gynecology careers, and the other-minority group continued to show greater interest in careers in internal medicine than did the other racial-ethnic groups.

Those Who Matched to Alternate Specialties

We were particularly interested in assessing whether the students who did not receive their first choices of specialties through the NRMP were able to pursue those choices later. To address this issue, we examined the likelihood of entering the NRMP first choice of specialty (or one consistent with it in terms of certification requirements) in the PGY-2 and the rates of attrition from GME for those who matched to alternate (second- or lower-ranked) choices. Table 6 shows the comparisons of the NRMP first-ranked choices of specialties with actual PGY-2 positions. Among all the graduates who matched to alternate specialties, 55% entered their first choices in PGY-2; that is, over half of those who did not receive matches to their preferred specialties through the NRMP were able to obtain positions in those specialties (or in specialties with compatible training requirements) in the second year of GME.

A small overall gender difference was noted in the likelihoods of all 1987 graduates returning to first-choice specialties in the second year of GME (57% of women versus 54% of men), but larger gender differences were found within racial-ethnic groups. The intragroup gender differences are important in interpreting variation among minority groups. For example, while 47% of the URM residents who did not match to their first choices of specialties obtained positions in their first-choice specialties in the second year, this figure masks the different experiences of URM women and URM men. The proportion of URM women was 65%, compared with 39% for URM men. In other words, URM women appear to have had a better-than-average chance of eventually entering their desired specialties, while URM men had a much lower-than-average chance. Other-minority men fared better (49% changed to first choices) than URM men, but other-minority men fared less well than other-minority women (53% of whom had changed).

Nonminority men were the most likely of all men (55%) to persevere for their first choices of specialties. The gender pattern observed among nonminorities was the same as that found for the other groups, where women were more likely to switch, though the size of the difference (2%) for nonminorities was minimal.

Among all the residents who matched to primary care residencies and for whom these were not their first choices of specialties, 49% secured positions in their preferred specialties by their second year of residency. This rate was lower than that of the residents who matched to alternate specialties in all other specialties (57%).

In both the primary care specialties and all other specialties, the likelihood of obtaining one's first choice in PGY-2 varied by racial-ethnic group. Among the first-year residents in primary care, the URM residents were least likely to obtain positions in their first choices of specialties (40%), though this is still a substantial amount of change. Nonminority and other-minority residents were about equally likely to enter their first-choice specialties (50% and 51%, respectively). Of the residents in other specialties, other minorities were least likely to enter their first-choice specialties (49%), followed by URMs (55%) and nonminorities (58%).

Attrition rates varied between those who had matched to first-choice specialties and those who had matched to alternate-choice specialties (Table 7). Those who had matched to alternate-choice specialties were more likely to discontinue their GME (9%) than were those who had matched to their first choices (6%). Among those matching to alternate choices, gender differences in rates of attrition were found within each minority group. URM women were more likely than URM men to quit GME training after PGY-1 (15% versus 10%). This pattern was the reverse of those found for nonminorities (7% of women versus 10% of men) and other minorities (4% of women versus 15% of men).

Conclusion

Overall, the URM students were slightly more likely to have had initial interests in primary care and to rank primary care specialties in the NRMP match process at rates higher than the other groups. The greater preference for primary care special-

Table 5

Specialties Entered in the Second Postgraduate Year by 1987 U.S. Medical School Graduates Compared by Race–Ethnicity and Gender*

Racial-Ethnic Status by Gender	Specialty Entered in PGY-2												Total No. in Row
	Family Practice		Internal Medicine		Pediatrics		Obstetrics-Gynecology		All Others		Not in GME		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Women													
Underrepresented minority													
African American†	40	11.9	80	23.7	46	13.6	41	12.2	98	29.1	32	9.5	337
American Indian, Alaskan Native	4	14.3	3	10.7	3	10.7	5	17.9	10	35.7	3	10.7	28
Mexican American	12	16.0	17	22.7	12	16.0	14	18.7	13	17.3	7	9.3	75
Mainland Puerto Rican	2	7.4	9	33.3	5	18.5	2	7.4	6	22.2	3	11.1	27
Other minority‡	27	6.4	133	31.7	62	14.8	36	8.6	131	31.2	31	7.4	420
Nonminority§	478	12.5	876	22.9	637	16.7	338	8.9	1,253	32.8	237	6.2	3,819
Unknown	3	6.1	10	20.4	10	20.4	4	8.2	19	38.8	3	6.1	49
Total	566	11.9	1,128	23.7	775	16.3	440	9.3	1,530	32.2	316	6.6	4,755
Men													
Underrepresented minority													
African American†	40	9.4	125	29.5	20	4.7	27	6.4	165	38.9	47	11.1	424
American Indian, Alaskan Native	5	16.7	7	23.3	1	3.3	3	10.0	11	36.7	3	10.0	30
Mexican American	36	25.5	38	27.0	12	8.5	3	2.1	41	29.1	11	7.8	141
Mainland Puerto Rican	3	6.4	15	31.9	2	4.3	1	2.1	22	46.8	4	8.5	47
Other minority‡	52	6.5	248	31.1	45	5.6	41	5.1	353	44.3	58	7.3	797
Nonminority§	1,022	12.6	1,921	23.6	480	5.9	297	3.7	3,894	47.9	520	6.4	8,134
Unknown	12	9.8	36	29.5	10	8.2	5	4.1	52	42.6	7	5.7	122
Total	1,170	12.1	2,390	24.7	570	5.9	377	3.9	4,538	46.8	650	6.7	9,695
GRAND TOTAL	1,736	12.0	3,518	24.3	1,345	9.3	817	5.7	6,068	42.0	966	6.7	14,450

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared, by the graduates' gender and race-ethnicity, the specialties the graduates entered in their second postgraduate year (PGY-2). They also analyzed data on graduates who were not involved in graduate medical education (GME).

†*African American* indicates all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents.

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

ties of the URM than the nonminority students is accounted for by the URMs' greater interests in family practice and pediatrics. During medical school these differences disappeared and the main difference found between these groups upon leaving medical school was that larger proportions of the URM and other-minority than the nonminority students desired careers in internal medicine. The URM students initially matched to their first preferences for primary care specialties at essentially the same rates as did other racial–ethnic groups, but more URM than other graduates switched into primary care residencies between the first and second years of GME.

The URM groups were found to have very different patterns of specialty preferences. Analyses showed that Mexican Americans, especially men, had a much higher preference for family practice than did any other group. That pattern was maintained throughout medical school and early residency training. The preferences of African Americans for family practice, internal medicine, and pediatrics were very similar to those of nonminorities.

The other-minority students differed from both the URM and the nonminority students in that the other-minority students had much less interest in family practice and slightly more interest in internal medicine before entering medical school. During medical schooling, other minorities had a large increase in the preference for training in internal medicine, which was greater than the corresponding increases for URM and nonminority students. The net result was that by the end of medical school the other-minority students preferred primary care specialties as often as did the nonminority and URM students, but the specialty mixes for the groups were different.

Another significant factor in explaining preference for primary care specialties is the variation by gender. The preference patterns of the individual minority groups were not the same for men and women. This was especially notable in the case of pediatrics, where the women of each group were nearly twice as likely as the men to prefer it before entering medical school. At that time, the URM and other-minority women chose pediatrics most often, but by the end of medical school, the nonminority women were the most likely to rank pediatrics first. This had the effect of widening the sex difference in overall preference for primary care among the nonminority students by the end of medical school.

Table 6

Numbers and Percentages of 1987 Medical School Graduates Matched to Alternate Specialties in PGY-1 Who Entered Their First-choice Specialties in PGY-2, Compared by Race–Ethnicity, Gender, and Alternate Specialty*

Gender, Race–Ethnicity and Alternative Specialty	No.	%
Graduates		
Men	480	54
Women	210	57
Total	690	55
Underrepresented minority†		
Men	24	39
Women	17	65
Total	41	47
Other minority‡		
Men	32	49
Women	24	53
Total	56	51
Nonminority§		
Men	419	55
Women	167	57
Total	586	56
Primary care specialties		
Underrepresented minority†	17	40
Other minority‡	22	51
Nonminority§	175	50
All other specialties		
Underrepresented minority†	24	55
Other minority‡	33	49
Nonminority§	406	58

*As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program, they compared the numbers and percentages of the graduates matched to alternate specialties (their second or lower-ranked choices) in their first postgraduate year (PGY-1) who entered their first-choice specialties (or specialties consistent with their first choices in terms of certification requirements) in their second postgraduate year (PGY-2) according to the graduates' gender, race–ethnicity, and alternate (PGY-1) specialties.

†*Underrepresented minority* indicates American Indians and Alaskan Natives, Mexican Americans, Mainland Puerto Ricans, and African Americans (i.e., all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents).

‡*Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

§*Nonminority* indicates whites not of Hispanic origin.

The other major difference before medical school between the URM and the other students was in the preference for obstetrics–gynecology. The URM students, particularly African-Americans and Mexican-American women, were twice as likely to choose this specialty as were the nonminority or other-minority students. The

Table 7

Rates of Attrition after One Year of Residency Training for the 1987 U.S. Medical School Graduates Who Received Positions through the NRMP, Compared by Race–Ethnicity and Gender[*]

Racial–Ethnic Status by Gender	All 1987 NRMP Match Recipients		1987 Match Recipients in First Choice of Specialty		1987 Match Recipients in Second or Lower Choice of Specialty	
	No.	%	No.	%	No.	%
Nonminority[†]						
Men	440	5.7	366	5.3	74	9.7
Women	215	5.9	196	5.7	19	6.5
Underrepresented minority[‡]						
Men	47	8.7	41	8.5	6	9.8
Women	40	9.2	36	8.3	4	15.4
Other minority[§]						
Men	43	5.9	33	5.0	10	15.2
Women	27	6.7	25	7.0	2	4.4
Total men[‖]	535	5.9	444	5.4	91	10.2
Total women[‖]	284	6.2	259	6.1	25	6.8
GRAND TOTAL[‖]	819	6.0	703	5.7	116	9.2

[*] As part of the authors' development of baseline data on specialty selection and success in obtaining residency positions for the medical school graduates of 1987 who participated in the National Resident Matching Program (NRMP), they compared the rates of attrition for the graduates who obtained positions through the NRMP according to the graduates' race-ethnicity and gender.

[†] *Nonminority* indicates whites not of Hispanic origins.

[‡] *Underrepresented minority* indicates American Indians and Alaskan Natives, Mexican Americans, Mainland Puerto Ricans, and African Americans (i.e., all graduates of African heritage, of whom approximately 97% were U.S. citizens or permanent residents).

[§] *Other minority* indicates Asians and Pacific Islanders, Commonwealth Puerto Ricans, and Hispanic groups other than Puerto Ricans and Mexican Americans.

[‖] Includes those individuals whose ethnicity was unknown, in addition to members of the underrepresented minorities, the other minorities, and the nonminority group.

URM men were more likely than other men to be interested in obstetrics–gynecology before medical school, but by the end of medical school and the second year of residency, African-American men preferred this specialty at a higher rate than did the other URM men, other-minority men, and nonminority men. Overall group differences in preference for obstetrics–gynecology remained throughout medical school, primarily as a result of greater interest among African-Americans and Mexican-American women.

Significant gender and racial–ethnic differences were found regarding NRMP match outcomes. Overall, women were more successful in obtaining matches to their first-choice specialties than were men. URMs, particularly URM men, were the most likely not to match at all. The highest nonmatch rates were for Native-American, African-American, and Mexican-American men.

Discussion

One of the concerns this research initially sought to address was whether URM students enter the primary care specialties in disproportionate numbers by choice or because they are somehow steered into them. Several of the findings shed light on this question. First, the results of the 1987 NRMP match revealed that the vast majority of minority students received their first choices of specialties in the program. The rates for matching to second-choice or lower-ranked specialties were similar for URM and all other students. The total number of URM students who received matches to second-choice or lower-ranked specialties in the NRMP was 87. These findings suggest that URMs are not channeled into specialties in which they are not interested. Of greater concern to the issue of obtaining a desired specialty is the large number of URMs who did not match, a finding consistent with results that have been documented from 1985 through 1990.[10,12,13] In our study, the unmatched rate for URMs was twice the national rate, and resulted in 130 URM students who participated in the 1987 NRMP match and did not receive a match through it. We do not know whether the unmatched URMs who obtained residency positions outside of the NRMP are overrepresented in primary care specialties.

A second source of information to illuminate the concern regarding URM graduates' disproportionate numbers in primary care is the pattern of specialty preferences expressed before medical school. The URM students entered medical school with greater interest in primary care than other-minority students and slightly more interest than nonminority students, and left with only slightly more interest than other groups. Thus, it appears that URMs are entering primary care specialties by choice; if medical schools were tracking URMs into primary care, then we would expect the proportion interested in these specialties to increase and the intergroup differences to increase. It should be noted, though, that the preferences for primary care among URMs were not evenly distributed across groups or specialties; rather, they were skewed by Mexican Americans' greater preference for family practice. In contrast, the specialty preferences of African Americans for primary care were very similar to those of nonminorities. Thus, statements based on aggregated ethnicity data (for example, that URMs are more likely to enter primary care than others) may oversimplify the true situation. Finally, there are two other significant factors, not examined in this research, that may lead to disproportionately high numbers of URMs' entering primary care fields: (1) differential medical school admission criteria for URM students that include their specialty preferences and (2) differential professional socialization between URM and other students.

Future research on this topic would benefit from (1) careful examination of variations within the URM and other-minority groups, (2) studies of the effects of professional socialization, (3) utilization of data on plans for certification and aspirations for practice specialties, (4) development of a survey of third-year residents about GME training experiences and career plans, (5) inclusion of information on the full GME experience and actual certification of students, and (6) analyses of the evaluation component (i.e., ranking of candidates) of the NRMP matching process.

This research was conducted in accordance with Health Resources and Services Administration contract no. 240-90-0061. The contents of the paper do not necessarily reflect the views or policies of the Health Resources and Services Administration.

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Declining Class Size and the Decline in Graduates Choosing Family Medicine

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Abstract—In light of the major concern about the marked decline in the numbers of graduates from U.S. medical schools who are entering family medicine, the authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies. Data were analyzed from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The analysis confirmed that declining class size is related to the decline in the production of family physicians. In particular, the 31 schools with the largest declines in the numbers of graduates overall (from the early 1980s compared with the late 1980s and 1990) demonstrated as a group a large fall (nearly 25%) in the production of family physicians. The authors conclude that the large reductions in class size in many medical schools are associated with even larger reductions in the numbers of future family physicians being graduated from U.S. medical schools. *Acad. Med.* 67(1992): 680–684.

The discipline of family medicine has recognized a marked downturn of U.S. medical school graduates entering its residencies during the late 1980s. That trend was particularly noted in the National Resident Matching Program's matches of 1988 and 1989.[1] The trend followed one year after a marked decline, which has also been persistent and worsening, in the specialty of internal medicine. Both declines continued through the Match of 1991. A long-cited goal of the American Academy of Family Physicians (AAFP) is that 25% of medical school graduates complete residencies and pursue careers in family practice.[1] Medical school graduating-class size peaked in the mid-1980s, when there were over 16,000 U.S. graduates a year. Twenty-five percent of that number would be approximately 4,000 graduates each year. Unfortunately, the number of U.S. medical school graduates in 1990 entering family practice was closer to 1,600 students. This number represents not only an almost 20% decline from the early 1980s, when over 2,000 students per year entered family medicine from U.S. medical schools but also a disturbing, indeed shocking, 60% shortage from perceived national needs.

National needs for family physicians are substantial, especially in underserved areas. For instance, how can the inhabitants of our large cities with their underserved areas receive appropriate medical care when, as an example, there are only 87 allopathic board-certified family physicians in New York City? That number represents about one specialist in family practice per 85,000 people. We recognize that other physicians are providing "general practice" services in these areas, but many do not have the recognized standard of training excellence in the field: an ambulatory care–based residency and board certification. Rural areas are in even greater need of family physicians, since smaller populations tend not to be able to support more limited specialists. The number of Health Professions Shortage Area designations is rising again. In 1991, Politzer and colleagues reviewed the declining supply of primary care physicians and made specific recommendations for increasing the supply, with special concern for the medically underserved.[2] Their recommendations included awarding more National Health Service Core scholarships, promoting required third-year clerkships in primary care, and creating financial incentives for primary care residency training. However, none of the recommendations addressed medical school class size.

Of great concern to family practice educators is that the decline in the numbers of graduates entering family practice has occurred in many of the medical schools where the departmental faculty members and the medical schools themselves are doing everything "right" to produce family physicians. Those schools are usually large state-supported schools in the midwestern and southern parts of the nation. Numerous factors are cited in the literature for the decline in interest in primary care careers, such as medical school debts, low practice income, lack of a department of family medicine, etc. However, the literature citing the effect of the size of medical school debt on career choice is mixed at best. Schools without a department have always been without one. Family medicine leaders are baffled, since the factors just mentioned have always been a fact of life for family physicians. Medical school experiences clearly affect specialty choices.[3] Lack of curricular time as an influential factor does have good support in the literature, but this issue relates to a smaller number of schools. Indeed, if anything, family practice departments have been increasing curricular time at many medical schools during the 1980s. Babbott and colleagues have documented the trends in specialty choice, including the decline of interest in primary care.[4] These studies rarely discuss class size as a potential factor in the decline.

We believed it was important to analyze the national data regarding the potential impact of the reduction

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in class sizes that began in the late 1980s at many medical schools, since it was noticed in our state of Ohio that there was a dramatic decline in the numbers of graduates entering family practice and that this decline occurred primarily in those schools where class sizes decreased the most. Like the rest of the country, our state was feeling the cry from numerous quarters, especially subspecialists in urban areas, that we have too many doctors, in spite of a statewide shortage of inner-city and rural primary care physicians. Medical school deans responded by reducing class sizes.

Method

Data were obtained from the book *Facts About: Family Practice* from the AAFP, 1990, and the recent update from Schmittling and colleagues.[1] This census is performed by family practice residency directors, who list all their first-year residents, their medical schools of graduation, and the months and years of graduation. Additionally, the American Medical Association numbers are used for the reports of class size. Data were extracted regarding the numbers of graduates of medical school classes during the ten years from 1981-1990 and the numbers of students going into family practice. The AAFP surveys residencies annually to obtain its data. We focused upon the schools that were producing the most family physicians, i.e., over 100 graduates in the decade, as this cohort accounts for 86% of the total production of family physicians in this decade. The data we reviewed and analyzed were the percentage change in class size, the actual change in class size, the percentage of graduates in each year entering family practice, the percentage change and the actual change in number of students entering family practice, and the number of graduates and the number of family physicians produced (the latter two are provided directly in the AAFP book). Ten years were selected because we recognized that medical schools have variations from class to class in specialty-choice decisions. For statistical analysis, we used analysis of variance (ANOVA), Tukey's honest significant difference (HSD) for multiple comparison, and the binomial test.

The data were analyzed to evaluate the effect of the total decrease in the number of graduates from medical school and how it relates to the drop in the production of family physicians. Osteopathic medical schools are not included in this study since the data from these medical schools were not included in the AAFP data until data on the 1990 graduating class was reported by Schmittling and colleagues.[1]

The 81 medical schools producing the bulk of the nation's family physicians were divided into three groups based upon changes in graduating-class sizes during the 1980s. For each school, we averaged the class sizes for 1981 and 1982 and compared this with the average for 1989 and 1990. The *large-decrease* group (31 schools) was defined as those schools with drops of more than ten graduates from 1981-1982 to 1989-1990. The *small-decrease* group (23 schools) was defined as those schools with drops of one to ten graduates during the same period. The *increased-size* group (27 schools) comprised those schools that had either increased numbers of graduates or no change in numbers (as a whole, the group showed an increased number). The years 1981 through 1990 were broken into subsets of four, three, and three years for analysis. Those cohorts were chosen recognizing that the last three years are the years of decline of graduates entering family practice.

Results

The three groups of schools were compared in terms of the numbers and percentages of their students who chose family practice programs for their residency training, as shown in Table 1.

Using ANOVA, we found a statistically significant change across time in the production of students entering family practice per year from the period 1981-1984 to the period 1988-1990 for the 81 medical schools taken as a whole ($F = 18.92$; df = 2,156; $p < .001$). There was also a difference between the three groups in terms of the rates of decrease in their production of students choosing family practice for their residencies ($F = 2.12$; df = 4,156; $p = 0.08$). Tukey's HSD was used to identify how the family medicine decreases varied by group. Analyses revealed that the difference was produced by the large significant drop in productivity of the large-decrease group. The decreases in productivity of the other two groups were less than half as large and were not statistically significant.

Between 1981-1984 and 1988-1990, the 31 schools in the large-decrease group had a fall in the annual production of family physicians of 6.3 graduates per school, compared with the 23 schools in the small-decrease group with a drop of 2.7 and the 27 schools in the increased-size group with a drop of 2.5. The latter group, as shown in Table 1, showed a combined drop in production of family physicians of 67, or 12.3%; the large-decrease group showed a combined fall in graduates entering family practice of 195 or 24.4%. Since in all 126 U.S. medical schools the total decline in family practice graduates per year in 1988-1990 compared with 1981-1984 was 347, the large-decrease group, of 31 primarily large state schools with about 30% of all graduates nationwide, accounts for 56% of the atrophy in the national production of family physicians. Of note, those large-decrease schools appear to be the very schools that have been most successful in producing family physicians and are usually characterized by a strong commitment on the part of admission committees, curriculum committees, administrators, etc.

As also shown in Table 1, the data were analyzed by looking at the groups' declines in the average annual percentages of graduates entering family practice residencies. When percentages are used, the data do not seem to show a problem. In fact, the average annual percentage of graduates entering family practice dropped slightly more in the increased-size group than it did in the other groups. But percentages do not fill family practice residencies or small towns or

Table 1

Numbers of All Graduates and Numbers and Percentages of Graduates Entering Family Practice Residencies for Three Groups of Medical Schools Based on Changes in Class Size, 1981–1990*

	No. and % Graduates by Time Period			Change (1981-1984 versus 1988-1990)	
Class-size Group	1981-1984	1985-1987	1988-1990	In No. or % Points	(In %)
Increased-size group ($n = 27$ schools)					
Average no. graduates per year	3,397	3,689	3,668	271	(8.0%)
Average no. entering family practice residencies per year	545	526	478	−67	(−12.3%)
Average % entering family practice residencies per year	16.0%	14.3%	13.0%	−3.0	(−18.7%)
Small-decrease group ($n = 23$ schools)					
Average no. graduates per year	2,889	2,905	2,813	−76	(−2.6%)
Average no. entering family practice residencies per year	411	392	350	−61	(−14.8%)
Average % entering family practice residencies per year	14.2%	13.5%	12.4%	−1.8	(−12.7%)
Large-decrease group ($n = 31$ schools)					
Average no. graduates per year	5,195	4,975	4,633	−562	(−10.8%)
Average no. entering family practice residencies per year	800	729	605	−195	(−24.4%)
Average % entering family practice residencies per year	15.4%	14.7%	13.1%	−2.3	(−14.9%)

*The authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies, using data from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The schools were divided into three groups based on changes in their graduating-class sizes between 1981–1982 and 1989–1990. The *increased-size* group consisted of those schools that showed increases or no change; the *small-decrease* group comprised schools that showed decreases of from one to ten graduates; and the *large decrease* group consisted of the schools that had decreases of more than ten graduates.

rural areas or inner cities. Analysis of the numbers of family physicians produced by the three groups shows the dramatic impact discussed previously. The impact from the changes in the actual numbers of graduates more than offsets any impact from the changes in average annual percentages. Specifically, the drop of 24.4% in the actual numbers of graduates entering family practice in the large-decrease group versus 12.3% and 14.8% for the other group represents nearly a twofold difference.

Table 2 shows the percentage changes in total numbers of graduates and numbers of family practice graduates for the 31 schools in the large-decrease group between 1981–1984 and 1988–1990. This huge contribution to the decline in the number of family physicians from a small number of schools is notable, as is the relationship of decline in class size to production of graduates entering family practice. Of the 31 schools, 21 showed a larger percentage decrease in family practice graduates than in total graduates (binomial test, $p = .07$). There appears to have been a significant, persistent effect of the decreasing class size on the production of family physicians in direct proportion to the change in class size in the large-decrease group, with 12 of the 20 schools having the greatest decreases in class size also having greater than 30% declines in the production of family physicians.

Discussion

There is a crisis in the provision of primary health care in this country. In 1981, 38.8% of medical school graduates planned to enter primary care specialties; this percentage plummeted to 25.4% in 1989.[5] Nutter and colleagues urged academic medicine to respond to physician-supply needs in the area of primary care.[6] Specific factors include the need for physicians to care for a burgeoning geriatric population and for underserved populations in rural areas and inner-city areas. There has been no solid explanation to this date as to why there have been marked declines in the numbers of family practice graduates and internal medicine graduates in the last four years.

The data presented here would appear to strongly support the concept that the widespread decision to decrease the numbers of medical school graduates in the late 1980s has greatly contributed to the shortage of family physicians. The schools with steady or increasing enrollments have blunted the impact of the drop in the numbers of graduates entering family practice. In the large-decrease group of schools, the drop in the numbers of graduates entering family practice has been accentuated.

Other factors involving specialty preference have been studied in recent years. Rabinowitz noted a significant attrition among the students who, before entering medical school, had said they were interested in family practice as a career; yet importantly he noted that the students who had this initial interest were still three times more likely to enter family practice residencies, in spite of the attrition, than were students who had originally considered other careers.[7] The same author has also evaluated the critical importance of a required third-year family practice clerkship and its impact upon career choice.[8] Dial and Elliot noted the very important role that federal scholarships play in assisting recipients toward primary care careers.[9] The lesser availability of the National Health Services Corps' scholarships in the late 1980s may well have been another factor in the overall decline of primary care careers. Dial and Elliot found that large debts did not play a role in deflecting students from primary care.

Another factor, seldom noted, is the likely loss of family practice physicians to the ambulatory type of training emphasized in the new emergency medicine residencies and the resurgent growth of combined internal medicine-pediatrics programs in the past decade. But the growth of those two fields occurred mainly before the drop in career interest in family practice. Still, the growth of the two fields may explain part of the slippage of family practice graduates not accounted for by class size. Also, as the number and size of programs in primary care internal medicine grow, these programs may attract students who would otherwise have entered family medicine. On the other hand, offsetting this factor is the huge decline of physicians entering general internal medicine.

Table 2

Percentage Changes in Numbers of All Graduates and Numbers of Graduates Entering Family Practice Residencies for the 31 Schools in the Large-decrease Group between Two Time Periods, 1981–1984 versus 1988–1990*

School	% Change in No. Graduates	% Change in No. Family Practice Graduates
Mississippi	−30.0	−42.2
Michigan	−23.0	−44.4
Howard	−22.5	+6.7
Oregon	−20.9	−8.8
Maryland	−19.6	−59.7
Tennessee	−18.1	−2.2
Kentucky	−16.4	−45.7
Hahnemann	−15.8	−67.5
U. of Indiana	−15.1	−38.0
Oklahoma	−14.7	−57.9
Louisville	−12.3	−37.7
Penn. State, Hershey	−12.3	−57.2
Missouri, Columbia	−10.2	−30.9
Minnesota	−9.7	−21.6
Cincinnati	−9.1	−4.8
Alabama	−9.0	+2.8
Rush	−8.4	−20.6
U. of South Carolina	−8.0	−50.8
California Davis	−7.9	+0.4
UCLA	−7.3	−35.3
Arkansas	−7.1	−20.6
U. of Wisconsin	−6.6	−19.5
Loma Linda	−6.0	+9.6
Baylor	−5.9	−2.5
Med. College of Georgia	−5.8	+35.3
Iowa	−4.9	−15.7
Texas, Galveston	−4.9	−22.2
St. Louis	−4.5	+38.0
U. of Illinois	−4.4	−16.8
Loyola	−1.5	−15.4
Jefferson	−1.2	−8.5

*The authors analyzed the effect of declining class size on the numbers of graduates entering family medicine residencies, using data from ten years of graduating classes (1981–1990) from the 81 medical schools graduating the most family physicians. The schools were divided into three groups based on changes in their graduating-class sizes between 1981–1982 and 1989–1990. The *large-decrease* group consisted of the schools that had decreases of more than ten graduates. Smaller decreases may appear here, since this table displays data for more years, i.e., 1981–1984 and 1988–1990.

Thus, it appears imperative that medical school deans, university presidents, state boards of regents, and other concerned parties address the effects of the decline in class size in their medical schools on family practice residency choices if they wish to have a pool of primary care physicians in the twenty-first century. This is a crucial issue because the 1990s appear to be a time for downsizing medical school class size.[10] Our data strongly suggest that, although some slippage in family physician production would have occurred, had the 31 schools remained constant in enrollment instead of dropping about 20 students per year, the United States would have graduated about 75 more family physicians annually in the late 1980s.

Another alternative that could possibly work (but hasn't been implemented despite much discussion) would be a marked decline in the number of non-primary-care specialty residencies that are offered by hospitals. Medical school deans and their university hospitals have been particularly reluctant to consider this option because of their large teaching and service needs and internal faculty pressures. Problematically, even if university hospitals chose this option, community hospitals could continue to offer non-primary-care positions. Another factor in this situation is the inability of residency review committees to limit residencies in certain oversupplied subspecialties, since their function is to evaluate quality of the residency, not to serve as a monitor of physician supply.

Medical schools receive literally billions of tax dollars for the production of physicians, yet the low output of primary care physicians has been cited by Robert G. Petersdorf, the president of the Association of American Medical Colleges (AAMC), as a particular failure of academic medical centers that requires urgent attention.[11] Somewhat paradoxically, it was Petersdorf who in 1986 urged the member institutions of the association to cut their class sizes in order to decrease the supply of physicians by means of a "manpower diet,"[12] which they did. Of great concern is that 14 medical schools, all with huge amounts of public support in the form of research grants, Medicare teaching reimbursements, and Medicare-Medicaid patient care revenue, had three or fewer graduates in 1990 who entered the discipline of family medicine. It appears that the availability of residencies in the limited specialties and a new paucity of medical school graduates is a major problem for producing family physicians.

One possible explanation for why this newly reported phenomenon, the relationship of the decline in class size and of the shortage of primary care physicians, occurs could be that presented in the following scenario: A medical school produces 200 graduates and 80 go into primary care specialties, so that 120 go into the other specialties. Then the medical school decides to cut the class size by 40 students such that there are 160 graduates every year. If there is the ready availability of a dermatology, ophthalmology, orthopedic, radiology, or some other popular residency, these limited specialty slots will probably continue to be filled. (We are aware that certain institutions have over 300 applicants for two or three dermatology residency positions.) Thus, one can postulate in this scenario there would indeed be 40 fewer students graduating from the medical school, but there might be 110 graduates going to the extremely popular, yet limited, specialties. Thus, the number of graduates from the medical school would decline by 20% (40 taken from the original base of 200), but the number of students entering primary care specialties would decline to 50 (30 fewer than the original base of 80), a 38% decline in the production of primary care physicians. Therefore, a 20% decrease in class size results in an 8% drop in specialty residents but a 38% drop in primary care residents.

Looking at the problem in opposite fashion may be even more useful. Adding 2,000 medical graduates annually should increase the output of primary care physicians by more than 50%, since nearly all the limited specialty positions are already being filled. The recent marked increase in the numbers of medical school applicants makes such an option possible to achieve while maintaining quality students.

The numbers of students entering general internal medicine appear to be declining even more than the numbers entering family practice, over a 50% decline according to the AAMC.[5] The decline in the numbers of students who are entering general internal medicine occurs at a time when this problem is compounded by the aforementioned decrease in class size. When one considers the numbers of pediatricians who enter subspecialties, the best estimates in the early 1990s suggest that only 23% (and falling) of our U.S. medical school graduates enter primary care, less than half the 50% felt needed by most authorities. Schroeder and colleagues make the case that thus far many deans have not responded and that academic medicine has let the public down in many areas excepting its research and technology successes.[13] Physician supply can and must be addressed by these public institutions.

Conclusion

Our findings suggest that the large decline in the class sizes of medical schools, particularly large state schools traditionally strong in producing primary care physicians, has been a major factor in the disastrous fall in production of family physicians. Immediate action by the deans and institutions is imperative to halt this worsening problem.

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Relationship between Indebtedness and the Specialty Choices of Graduating Medical Students

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As medical students shy away from generalist training leading to careers in family practice, general internal medicine, and general pediatrics, there is concern that mounting educational debt is driving students toward the more remunerative fields and thwarting efforts to overcome the country's shortage of primary-care physicians. Carrying the issue further, a well-known columnist recently attributed the high cost of health care in America to the indebtedness of medical students that causes them to pick high-income specialties where "they will then perform all the high-cost procedures that produce both their pay and bills from other providers for the high-tech tests, million-dollar machines and hospital treatments that create America's humongous medical bill."[1]

In truth, studies over the past decade have shown variable, and generally weak, relationships between the indebtedness of students and their choices of specialty training and practice.

French[2] reported that higher levels of debt were not found to be associated significantly with the choice of more lucrative specialties, based on a survey of residents and fellows at the University of Michigan Hospital. Bazzoli,[3] in a 1983 national survey of resident physicians by the American Medical Association, found that a high level of nonsubsidized debt [HEAL (Health Education Assistance Loan) loans] was associated with less likelihood of primary-care specialty choice. Geertsma and Romano[4] found that 1983 graduates of the University of Rochester who planned subspecialist careers had higher mean debt levels than did students intending generalist practice. Lindley and Dial[5] and Dial and Elliott,[6] from analyses of the Association of American Medical College's (AAMC's) 1983 Medical School Graduation Questionnaire, determined that debt was a weak discriminant but that high indebtedness was associated with a tendency to choose non-primary care specialties. Singer[7] concluded from a study of the 1983 cohort of U.S. medical school graduates followed through five postgraduate years that indebtedness at the time of graduation was a "significant but quite weak factor influencing primary care versus non-primary care specialty preference." A report by Park[8] showed no correlation between the mean indebtedness of 1989 medical school seniors and their generalist and specialist-subspecialist career intentions over a wide range of debt.

In response to the body of evidence that debt does not play a major role in specialty choice, some have suggested that researchers have measured the noise produced by confounding variables that masks the real influence of debt. Looked at in the aggregate, competing influences would have the effect of canceling out each other. As an illustration, students with limited resources might be driven toward or away from generalist specialties, depending on how they weigh the advantages of shorter training and less debt accrual versus greater debt accrual but better repayment prospects with longer subspecialty training.

A second confounding effect is the potentially different burdens of similar levels of debt, depending on whether the debt interest is subsidized [i.e., interest does not accrue during school and subsequent deferment and grace periods — Stafford, Perkins, HPSL (Health Professions Student Loan), and SLS (Supplemental Loans for Students) loans], or whether interest accumulation and compounding from the date of borrowing increases the burden of repayment (HEAL, MEDLOANS Alternative Loan Program, some private borrowing arrangements).

Exploration of the effect of repayment burden requires a look at the proportionate high-burden debt levels across different specialties.

Analysis of debt effect is confounded further by the coincidence of medical schools' educational and experiential variables. For example, it is hard to determine whether the higher non-generalist preferences of students at private medical schools are the effect of the greater indebtedness of students at private schools or the result of lesser educational exposure to the generalist specialties (especially family medicine) in those schools' curricula.

The purpose of this study was to evaluate the relationship between educational debt and specialty choice in the light of substantially higher student indebtedness occurring since the research on the graduating classes of the 1980s. In particular, this work has attempted to determine whether rising debt is a significant factor accounting for the declining interest of graduates in the generalist specialties. The study has examined the absolute and relative effects of debt on choices across individual and grouped specialties-subspecialties and has looked at private and public school influences, lengths of residency training, and the differential effects of debt burden across specialty choices of graduating students.

DATA SOURCES

Most of this analysis was based on data accumulated from the AAMC's Medical School Graduation Questionnaire (GQ), in particular that completed by the 1992 graduating classes. Altogether, there were 15,365 graduates in 1992; 12,088, or 78.7%, completed the questionnaire. Of the respondents, 8,053 declared their plans for specialty-subspecialty certification, while the

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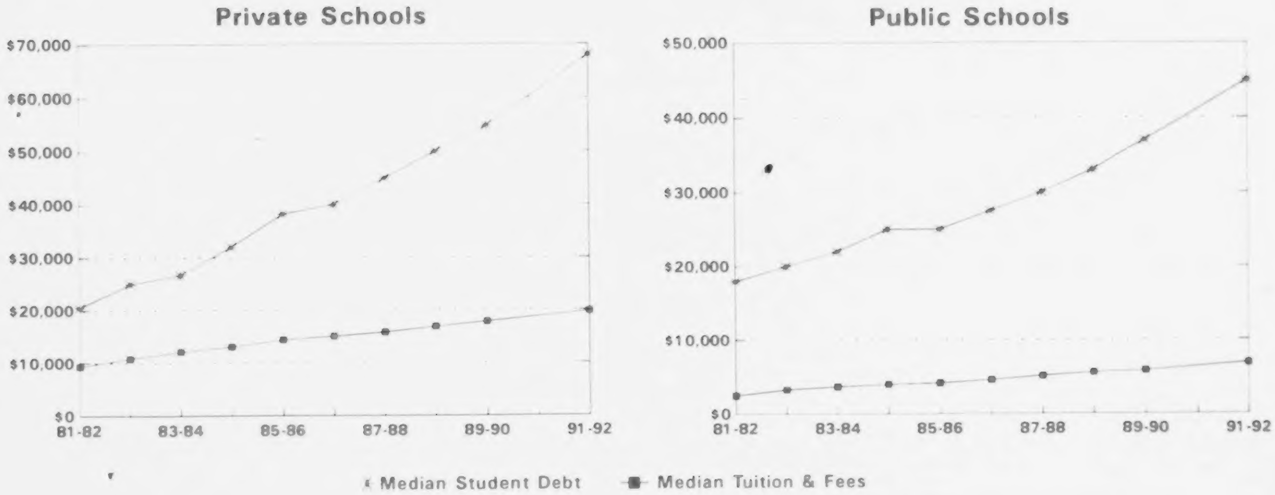

Figure 1. **Median educational debt of medical students and median tuition and fees of medical schools, 1981–82 through 1991–92. For public schools, the tuition and fees are for in-state residents.**

remainder were undecided.

Data on specialty choice from the 1992 GQ are not strictly comparable with pre-1990 findings. Changes in the question about planned certification, initiated in 1990, differentiated specialty and subspecialty decisions and uncovered a greater number of undecided responses than the earlier question format.

TUITION AND INDEBTEDNESS TRENDS

Figure 1 shows that the combined premedical and medical school indebtedness of graduating medical students has continued to rise over the past decade, with the debt levels greater for private medical schools than for public schools. For both private and public schools, the rise in indebtedness has been steeper than the increase in tuition and fees. The median levels of debt of indebted senior students were $20,500 and $18,000 in private and public medical schools, respectively, in 1981–82, rising to $68,000 and $45,000 in private and public schools, respectively, in 1991–92. (Prior AAMC reports have described students' *mean* debt. This overstates the central tendency because of the influence on the *mean* of a relatively small number of extreme values. Therefore, this report employs *median* debt as a more accurate measure of central tendency.)

TUITION AND FEE COMPONENT OF MEDICAL SCHOOLS' TOTAL REVENUE

Table 1 indicates that, over the past decade, income from medical student tuition and fees has declined slightly as a percentage of the total revenue of public schools, from 2.70% in 1982–83 to 2.24% in 1990–91. Tuition and fees constituted 7.31% of total private schools' revenue in 1981–82 and declined to 4.55% of total revenue in 1990–91. It must be acknowledged, however, that the apparent declines may be an artifact of increases in total revenue (or disclosure thereof) represented in the schools' annual financial reporting (the LCME Part 1A Annual Financial Questionnaire administered by the Association of American Medical Colleges).

TABLE 1. Tuition and Fee Percentages of Total Medical School Revenues (Dollars in Thousands)

	Public Schools			Private Schools		
Year	Total Revenue	Tuition & Fees	% Tuition & Fees	Total Revenue	Tuition & Fees	% Tuition & Fees
1982–83	$ 4,491,463	$121,143	2.70%	$ 3,704,377	$270,873	7.31%
1983–84	4,916,296	138,384	2.81	4,122,779	303,462	7.36
1984–85	5,463,349	150,334	2.75	4,638,593	329,410	7.10
1985–86	6,068,111	167,551	2.76	5,024,242	352,056	7.01
1986–87	6,560,908	178,358	2.72	6,036,009	374,940	6.21
1987–88	7,340,665	189,552	2.58	6,755,351	396,322	5.87
1988–89	8,803,704	209,776	2.38	7,947,299	418,078	5.26
1989–90	9,908,365	224,414	2.26	8,918,985	441,678	4.95
1990–91	10,801,399	241,790	2.24	10,203,275	464,359	4.55

TABLE 2. Mean Ratings of Factors Influencing Choice of Medical Specialty[*]

	1990	1991	1992
Courses or clerkships in the area	3.2	3.1	2.4[†] 3.1[†]
Type of patient problems encountered	3.3	2.8	2.9
Intellectual content of the specialty	3.2	2.8	2.9
Challenging diagnostic problems	3.2	2.8	2.8
Example(s) of physician in the specialty	3.1	2.8	2.9
Possess skills or talent unique to specialty	3.0	2.8	2.6
Consistent with personality		3.0	3.0
Opportunity to provide primary care	2.2	2.2	2.6
Good income (relative to other specialties)	1.8	1.7	1.7
Length of residency	1.3	1.7	1.7
Ease of getting a residency		1.6	1.6
Minimum uncertainties in diagnosis or therapy	1.4	1.7	1.7
Prestige within profession	1.5	1.6	1.7
Level of educational debt	0.8	1.7	1.8

Sources: Medical School Graduation Questionnaires, 1990, 1991, and 1992.

[*] Rating on a scale of 0 = no influence to 4 = major positive influence.

[†] In 1992, courses and clerkships were rated separately.

INDEBTEDNESS IN THE HIERARCHY OF FACTORS INFLUENCING SPECIALTY CHOICE

Since 1988, the GQ has captured students' ratings of factors that influenced their specialty choices. Over time, the responses of successive graduating classes have shown a remarkably consistent hierarchy of influences (Table 2).

According to senior students, the factors of greatest influence were the courses in the area, particularly the clerkships; the type of patient problems encountered; the intellectual content and challenge of the specialty; the example of a physician in the specialty; and the fit of personal skills and talent with the specialty. Students rated the level of educational debt well below these factors.

MEDICAL STUDENTS' DECLINING INTEREST IN GENERALIST SPECIALTIES

Table 3 shows that the number of students planning certification in the generalist specialties has declined significantly over the past decade. In 1982, 36.1% of graduates planned certification in the generalist specialties; in 1992, only 14.6% had such intentions.

It must be noted that these are percentages of the total numbers of graduating students who had decided about a particular specialty–subspecialty, either as the sole choice or the first choice of those under consideration. Students planning generalist specialty certification were those intending certification in family practice, general internal medicine, and general pediatrics and *not* planning subspecialty certification in these fields. In 1992, there was another 26% of students across these specialties planning generalist certification but undecided about subspecialty certification. For purposes of this study relating debt to specialty choice, only the clear choices were examined and no attempt was made to estimate how the undecided cohorts might eventually be allocated between generalist and subspecialist categories.

MEDICAL STUDENTS' RISING INTEREST IN NON-GENERALIST SPECIALTIES

During the past decade, there has been rising interest of graduating students in the medical specialties and the support specialties (see definitions in the footnote to Table 4).

In 1992, 32.1% of graduating students planned certification in the medical specialties, compared with 17.6% in 1982. Individual fields of increased popularity have included the subspecialties of internal medicine (particularly cardiology, gastroenterology, geriatrics, and pulmonary diseases), pediatrics (pulmonology, cardiology, hematology–oncology, and nephrology), and allergy–immunology and dermatology.

In 1992, 23.7% of graduating students planned certification in the support specialties, compared with 14.7% in 1982. Fields of

TABLE 3. Percentages of Graduating Seniors Planning Certification in Generalist Specialties[*]

Specialty	1982 (%)	1987 (%)	1992 (%)
Family medicine	15.5	14.8	9.0
General internal medicine	14.4	8.6	3.2
General pediatrics	6.2	5.7	2.4
Total generalist specialties	36.1	29.1	14.6

Sources: Medical School Graduation Questionnaires, 1982, 1987, and 1992.

[*] Beginning in 1990, the question about specialty certification was changed to differentiate specialty and subspecialty choices at the time of graduation. Thus, 1992 figures are not strictly comparable with pre-1990 data. The percentages shown here are based on 10,062, 10,386, and 8,053 responding students in 1982, 1987, and 1992, respectively, who had decided on certification.

TABLE 4. Percentages of Graduating Seniors Planning Certification in Non-generalist Specialties[*]

Specialty Certification Group	1982 (%)	1987 (%)	1992 (%)
Medical specialties[†]	17.6	23.2	32.1
Surgical specialties[‡]	31.6	29.4	29.5
Support specialties[§]	14.7	18.3	23.7

Sources: Medical School Graduation Questionnaires, 1982, 1987, and 1992.

[*] Percentages based on 10,062, 10,386, and 8,053 responding students in 1982, 1987, and 1992, respectively, who had decided on certification (see further explanation, Table 3).

[†] Medical specialties are family practice subspecialties, internal medicine subspecialties, pediatric subspecialties, psychiatry and neurology and their subspecialties, allergy and immunology and subspecialties, and dermatology and its subspecialties.

[‡] Surgical specialties are general surgery and its subspecialties, colon and rectal surgery, neurological surgery, obstetrics and gynecology and subspecialties, ophthalmology, orthopedic surgery, otolaryngology, plastic surgery, thoracic surgery, and urology.

[§] Support specialties are anesthesiology and its critical care subspecialty, emergency medicine, nuclear medicine, pathology and its subspecialties, physical medicine and rehabilitation, preventive medicine and public health, and radiology and related subspecialties.

increased interest in the support specialties have included anesthesiology, emergency medicine, and radiology.

The percentage of intended certification in the surgical specialties decreased slightly between 1982 and 1987 (from 31.6% to 29.4%) and was virtually unchanged in 1992 (29.5%).

RELATIONSHIP BETWEEN INDEBTEDNESS AND CHOICE OF SPECIALTY

Table 5 enumerates the specialty certification choices of those 1992 medical school graduates who had made specialty-

TABLE 5. Indebtedness of 1992 Medical School Graduates by Specialty Certification Choice*

Specialty Certification Choice	Number	Median Debt	Level of Debt				Percentage of Total Debt from High-burden Sources†
			Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt between $50,000 and $74,999	Percentage with Debt ≥ $75,000	
Allergy and immunology	26	$50,000	11.5	30.8	30.8	26.9	28.5
Anesthesiology and critical care	549	52,500	17.0	36.6	20.9	25.5	25.1
Colon and rectal surgery	19	52,500	15.8	36.8	31.6	15.8	23.9
Dermatology and subspecialties	153	50,000	23.5	35.6	20.8	20.1	20.6
Emergency medicine	440	52,100	13.8	37.8	21.4	27.0	23.2
Family practice	728	50,000	15.9	42.0	22.8	19.3	17.6
Family practice subspecialties	153	50,000	17.9	39.1	25.2	17.9	22.1
General internal medicine	255	50,000	13.3	40.3	22.2	24.2	21.9
Internal medicine subspecialties	1,318	50,000	21.8	36.5	21.4	20.3	21.7
Neurology and child neurology	177	50,000	22.2	33.3	19.3	25.1	25.1
Obstetrics–gynecology	218	55,700	13.0	36.2	30.9	19.8	21.6
Obstetrics/gynecology subspecialties	329	54,750	18.1	35.6	20.9	25.3	25.9
Ophthalmology	275	48,000	23.2	39.7	20.6	16.5	18.6
Pathology	27	40,000	22.2	36.0	21.2	17.5	20.6
Pathology subspecialties	134	50,000	17.7	40.0	22.3	20.0	21.3
General pediatrics	196	47,450	13.7	44.2	22.1	20.0	22.7
Pediatrics subspecialties	429	49,750	16.1	42.0	26.1	15.8	19.4
Physical medicine and rehabilitation	140	50,000	18.7	38.1	21.6	21.6	21.7
Preventive medicine and public health and subspecialties	33	45,000	15.6	46.9	21.9	15.6	16.9
Psychiatry	129	56,500	12.9	35.5	25.8	25.8	21.5
Psychiatry subspecialties	203	50,000	21.0	37.9	23.6	18.5	22.2
Radiology	44	43,988	14.3	47.6	16.7	21.4	14.9
Radiology subspecialties	538	47,000	24.2	40.8	18.5	16.4	21.1
General surgery	172	60,000	27.6	28.8	20.2	23.3	22.5
Surgical subspecialties	293	55,000	21.2	32.5	22.6	23.7	25.0
Nuclear medicine	3	73,000	00.0	00.0	50.0	50.0	38.2
Neurological surgery and critical care medicine	81	55,000	20.0	29.3	25.3	25.3	29.1
Orthopedic and hand surgery	429	50,000	23.1	36.1	20.2	20.7	24.3
Otolaryngology	191	50,000	25.4	36.0	21.2	17.5	22.5
Plastic and hand surgery	118	53,000	26.3	33.3	24.6	15.8	27.4
Thoracic surgery	97	50,000	20.7	31.5	31.5	16.3	24.5
Urology	154	50,000	22.4	38.1	19.0	20.4	22.5
Total decided respondents	8,053	50,000	19.4	37.7	22.1	20.8	22.2
Total undecided respondents	2,859	50,000	19.6	38.8	21.0	20.6	21.0
No response/not planning certification	1,176	50,000	20.7	37.2	21.7	20.4	21.0
All respondents	12,088	50,000	18.8	36.6	20.8	20.1	21.6

Source: 1992 Medical School Graduation Questionnaire.

*The number in specialty certification groups, 8,053, represents respondents who had made specialty and subspecialty decisions. Of the total of 12,088 respondents, 2,859 were undecided about specialty and subspecialty certification, and 1,176 did not respond or do not plan to seek certification.

†High-burden debt includes HEAL, MEDLOANS, and some private sources with nonsubsidized interest that accrues from the date of borrowing and is compounded semiannually.

subspecialty decisions, showing for each choice the students' median debt; percentage with no debt; percentages with debts up to $49,999, between $50,000 and $74,999, and $75,000 and over; and the percentage of debt in each case from high-burden sources (primarily HEAL, MEDLOANS Alternative Loan Program, and some private borrowing arrangements in which interest accrues from the date of borrowing and is compounded semiannually).

The overall median debt of indebted students who were decided about specialization–subspecialization was $50,000 in 1992; 19.4% of this group reported no debt; and 20.8% had debt greater than $75,000. There were significant differences in median debt levels across specialties. Of students choosing specialties in significant numbers (100 or more), those planning certification in general surgery had the highest median debt ($60,000), while those opting for radiology subspecialties had the lowest median debt ($47,000).

There was no difference between the median debt levels ($50,000) of students intending certification in the general specialty of internal medicine only and those planning subspecialty certification therein, and there was only a small difference between students opting for general pediatrics only ($47,450) and those planning certification in pediatrics subspecialties ($49,750). For students planning certification in general internal medicine and general pediatrics, the percentage without debt was lower and the percentage with debts of $75,000 or more was higher than for students intending subspecialty training in those fields.

There were higher percentages of debts of $75,000 or more amongst students planning certification in anesthesiology, emergency medicine, psychiatry, and neurological surgery than amongst those choosing family practice, general internal medicine, and general pediatrics.

Debt from high-burden loan sources was more common for students planning certification in anesthesiology, neurology, obstetrics–gynecology subspecialties, and surgery specialties and subspecialties. The percentage of debt from high-burden sources was essentially the same for graduates aiming for general internal medicine and internal medicine subspecialties. Debt was less burdensome for those intending pediatric subspecialization than those choosing general pediatrics.

The patterns of median debt, range of debt, and debt repayment burden shown in Table 5 do not constitute convincing evidence that indebtedness is a significant force driving students away from the generalist specialties and toward the medical and support specialties (as these specialties are defined above). However, it is worth noting that more students selecting anesthesiology, emergency medicine, and surgery subspecialties had high-burden debts and debts over $75,000. On the other hand, fewer students heading for the subspecialties of internal medicine and pediatrics had debts over $75,000 than was true for those selecting the corresponding general specialties; and the debt burden was higher for students choosing general pediatrics than for those intending pediatrics subspecialization.

INDEBTEDNESS OF SPECIALTY CERTIFICATION GROUPS

Table 6 arrays 1992 debt levels for each of the specialty certification groups. The median debt was roughly the same for all specialty groups ($50,000). However, the smallest percentage of graduates without debt had chosen the generalist specialties, and the largest proportion with debts of $75,000 or greater had opted for the support specialties.

INDEBTEDNESS OF MEDICAL SCHOOL GRADUATES IN SPECIALTY CERTIFICATION GROUPS: PRIVATE AND PUBLIC SCHOOLS

Table 7 shows the differences in debt levels between the graduates of private and public schools. The median debt of all private-school students declaring specialty plans was $68,000 in 1992; for graduating students of public medical schools the median debt was $45,000. There was a slightly higher percentage of graduates without debt from private schools (20.1%), compared with graduates of public schools (18.9%). A significantly higher percentage of private-school graduates (35.3%) than public-school graduates (10.9%) had debts of $75,000 or more.

Only 10.4% of private-school graduates with declared intentions planned certification in the generalist specialties, compared with 17.6% of public-school graduates. Of note for private schools, the median debt of students opting for the generalist specialties ($70,000) was identical to that for students planning

TABLE 6. Indebtedness of 1992 Medical School Graduates in Specialty Certification Groups*

Specialty Certification Group	Number	Median Debt	Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt $50,000–$74,999	Percentage with Debt ≥ $75,000
Generalist specialties	1,179	$50,000	15.0	42.0	22.5	20.5
Medical specialties	2,588	50,000	20.1	37.3	22.7	19.9
Surgical specialties	2,378	51,000	21.6	35.1	22.6	20.7
Support specialties	1,908	50,000	18.5	39.0	20.4	22.2
All groups	8,053	50,000	19.4	37.7	22.1	20.8

Source: 1992 Medical School Graduation Questionnaire.
*Specialty certification groups as defined in Table 4.

TABLE 7. Indebtedness of 1992 Medical School Graduates in Specialty Certification Groups: Public Versus Private Schools*

Specialty Certification Group	Number	Median Debt	Percentage with No Debt	Percentage with Debt up to $49,999	Percentage with Debt $50,000–$74,999	Percentage with Debt ≥ $75,000
Private schools						
Generalist specialties	340	$70,000	12.2	25.7	19.9	42.2
Medical specialties	1,176	64,000	19.8	28.8	18.2	33.2
Surgical specialties	1,034	65,500	23.9	25.3	17.5	33.4
Support specialties	730	70,000	19.1	29.3	13.2	38.4
Total	3,280	68,000	20.1	27.5	17.0	35.3
Public schools						
Generalist specialties	839	45,000	16.1	48.6	23.6	11.7
Medical specialties	1,412	45,000	20.4	44.3	26.4	8.9
Surgical specialties	1,344	46,000	19.9	42.6	26.5	11.0
Support specialties	1,178	46,000	18.1	42.9	24.7	12.2
Total	4,773	45,000	18.9	44.7	25.5	10.9
All groups	8,053	50,000	19.4	37.7	22.1	20.8

Source: 1992 Medical School Graduation Questionnaire.

*Specialty certification groups as defined in Table 4.

certification in the support specialties and was greater than the median debts of those heading for the medical specialties ($64,000) and the surgical specialties ($65,500). For public schools, there was little difference in median student debt levels across the specialty certification groups.

On its face, the similarity of the median debt levels of students opting for the generalist specialties and those headed toward the support specialties casts doubt on the level of debt as a determinant of specialty choice. However, it is possible that students with high indebtedness may consider—for different reasons—that either specialty group has a net advantage: the one because three-years' training in a generalist specialty will accrue less debt and allow earlier practice and repayment; or the other because training in a support specialty, while taking longer and accruing more debt, has a better income and repayment dividend waiting at the end.

INFLUENCE OF LENGTH OF RESIDENCY ON SPECIALTY CHOICE

Table 2 shows that length of residency ranked relatively low as a factor influencing graduating students' choices of medical specialties. However, Table 8 indicates that the influence of length of residency differed across the specialty certification groups. Although only 9.0% of all students declaring specialty and subspecialty certification intentions in 1992 rated length of residency as a strong or major influence, 15.2% of graduates selecting generalist specialties and 11.5% of those selecting support specialties gave length of residency strong or major ratings.

Table 9 shows how the 1992 graduates rated the influence of length of residency on their specialty choices, across the specialty certification groups and for various levels of debt. For all specialty groups taken together, between 7.7% of students (those

TABLE 8. Influence of Length of Residency on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups*

Specialty Certification Group†	Number	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	1,179	30.0	54.8	15.2
Medical specialties	2,588	50.3	41.7	8.1
Surgical specialties	2,378	64.5	30.6	4.9
Support specialties	1,908	47.2	41.3	11.5
All groups	8,053	50.8	40.2	9.0

Source: 1992 Medical School Graduation Questionnaire.

*Influence of length of residency based on rating scale of 0 = no influence, 1–2 = minor–moderate influence, and 3–4 = strong–major influence (see Table 2).

†Specialty certification groups as defined in Table 4.

TABLE 9. Influence of Length of Residency on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups and Debt Categories*

Specialty Certification Group†	No Debt			Debt up to $49,999			Debt between $50,000 and $74,999			Debt ≥ $75,000		
	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	24.4	61.0	14.6	29.6	57.1	13.3	36.0	49.0	15.1	29.1	50.9	20.0
	(40)	(100)	(24)	(134)	(258)	(60)	(86)	(117)	(36)	(64)	(112)	(44)
Medical specialties	52.2	40.5	7.3	49.3	44.0	6.7	48.7	40.4	10.8	51.1	40.6	8.3
	(249)	(193)	(35)	(443)	(396)	(60)	(265)	(220)	(59)	(239)	(190)	(39)
Surgical specialties	63.6	32.1	4.3	64.0	31.4	4.6	64.6	29.7	5.7	65.2	28.9	5.8
	(297)	(150)	(20)	(488)	(239)	(35)	(318)	(146)	(28)	(291)	(129)	(26)
Support specialties	49.5	40.7	9.8	45.3	43.3	11.4	49.1	39.1	11.7	45.6	40.9	13.5
	(151)	(124)	(30)	(305)	(292)	(77)	(172)	(137)	(41)	(173)	(155)	(51)
All groups	52.2	40.1	7.7	49.2	42.5	8.3	51.8	38.2	10.1	50.7	38.7	10.6
	(737)	(567)	(109)	(1,370)	(1,185)	(232)	(841)	(620)	(164)	(767)	(586)	(160)

Source: 1992 Medical School Graduation Questionnaire.
*Influence of debt on specialty choice based on rating scale given in Table 8. Number of graduates in each group shown in parentheses.
†Specialty certification groups as defined in Table 4.

with no debt) and 10.6% (those with debt of $75,000 or more) rated length of residency as a strong or major factor influencing specialty choice. Students planning certification in the generalist specialties more commonly (14.6% of those with no debt, rising to 20.0% of those with debt of $75,000 or more) considered length of residency a strong or major influence. Students selecting the support specialties more commonly rated length of residency as strongly influential at debt levels of $75,000 or more (13.5%). It is important to note that length of residency reached these levels of strong or major influence at the convergence of specialty choice and level of debt affecting a small fraction of the entire sample of GQ respondents.

DEBT AS A FACTOR IN SPECIALTY CHOICE

In Table 2, the level of educational debt ranks relatively low in the hierarchy of factors influencing graduates' specialty choices. It is possible, however, that indebtedness is a stronger influence on graduates' plans for certification within specialty group choices. Table 10 shows that, overall, 70.2% of the graduates across the specialty groups considered debt to be of no influence on their choices, and 23.6% rated it a minor or moderate influence. Across the specialty groups, only 6.2% of graduates overall rated debt as a strong or major influence on their decisions, ranging from 4.2% of those planning certification in the generalist specialties to 9.6% of those planning certification in the support specialties.

Table 11 shows how the graduates rated the influence of educational debt as a factor in their specialty choices, across the specialty certification groups and for various levels of debt. For no debt, across the specialty groups, only 2.2% of students rated educational debt as a strong or major influence, and there was little difference across the specialty groups. Debt more commonly was rated important with increased debt levels, assuming strong or major influence for 12.9% of those with debts of $75,000 or greater. Debt was rated a strong or major influence more frequently by graduates with debts of $50,000–$74,999 who were planning certification in the support specialties (11.7%) and for graduates with debts of $75,000 or more who

TABLE 10. Influence of Debt on Specialty Choices of 1992 Medical School Graduates by Specialty Certification Groups*

Specialty Certification Group†	Number	Percentage "No Influence"	Percentage "Minor" or "Moderate" Influence	Percentage "Strong" or "Major" Influence
Generalist specialties	1,179	73.2	22.5	4.2
Medical specialties	2,588	73.2	22.1	4.7
Surgical specialties	2,378	71.9	22.1	6.0
Support specialties	1,908	62.0	28.4	9.6
All groups	8,053	70.2	23.6	6.2

Source: 1992 Medical School Graduation Questionnaire.
*Influence of debt on specialty choice based on rating scale given in Table 8.
†Specialty certification groups as defined in Table 4.

were planning certification in the surgical (13.9%) and support (20.3%) specialties. However, the number of students with debts of that magnitude and planning certification in these specialties was a small fraction of the entire sample of GQ respondents.

CONCLUSIONS

Analysis of data from the 1992 GQ has shown that educational debt was not a factor significantly influencing most graduates' specialty choices. Debt did not appear to be driving students to subspecialize in most of their chosen specialties, including internal medicine and pediatrics. As a strong or major influence, debt affected the specialty choices of only 6.2% of the 1992 graduates who had decided on a specialty. However, for students with debts of $75,000 or more, debt became more important, having a strong or major influence on the choices of surgical (13.9%) and support (20.3%) specialties. Although the effects of debt on specialty choice were found to be small, taking on greater significance with debts of $75,000 or more, it is disturbing to note that over 20% of medical school graduates have such levels of indebtedness.

Length of residency training, as a factor affecting specialty choice, generally was a strong or major influence for only 9.0% of respondents. However, this number increased to 20.5% for respondents with debts of $75,000 or more who planned generalist specialty certification, suggesting that high debt turned students toward, as well as away from, the generalist specialties.

The importance of debt tends to be exaggerated when evaluated, as here, in isolation. As the GQs have shown consistently over the past decade, other factors far outweigh the effect of debt. Whatever the merit of reducing student debt for its own sake, strategies to enhance interest in the generalist specialties will need to be applied where they are likely to be more influential.

TABLE 11. Influence of Educational Debt on Specialty Choices of 1992 Medical School Graduates in Specialty Certification Groups and Debt Categories*

Specialty Certification Group†	No Debt			Debt up to $49,999			Debt between $50,000 and $74,999			Debt ≥ $75,000		
	Percentage "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence	Percent "No Influence"	Percent "Minor" or "Moderate" Influence	Percent "Strong" or "Major" Influence
Generalist specialties	85.1% (137)	11.8% (19)	3.1% (5)	73.3% (330)	24.2% (109)	2.4% (11)	77.2% (183)	17.7% (42)	5.1% (12)	59.2% (129)	32.6% (71)	8.3% (18)
Medical specialties	86.3 (411)	12.2 (58)	1.5 (7)	76.5 (685)	18.8 (168)	4.8 (43)	66.0 (359)	29.0 (158)	5.0 (27)	60.7 (283)	31.1 (145)	8.2 (38)
Surgical specialties	88.4 (410)	9.7 (45)	1.9 (9)	78.5 (598)	18.6 (142)	2.9 (22)	64.6 (319)	28.1 (139)	7.3 (36)	52.3 (234)	33.8 (151)	13.9 (62)
Support specialties	80.6 (245)	16.1 (49)	3.3 (10)	70.4 (473)	24.4 (164)	5.2 (35)	52.7 (184)	35.5 (124)	11.7 (41)	40.6 (154)	39.1 (148)	20.3 (77)
All Groups	85.6 (1,203)	12.2 (171)	2.2 (31)	75.0 (2,086)	21.0 (583)	4.0 (111)	64.3 (1,045)	28.5 (463)	7.1 (116)	53.0 (800)	34.1 (515)	12.9 (195)

Source: 1992 Medical School Graduation Questionnaire.

*Influence of debt on specialty choice based on rating scale given in Table 8. Number of graduates in each group shown in parentheses.

†Specialty certification groups as defined in Table 4.

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